SPACECRAFT A little bumpy around mach 2.

CAPCOM Roger high scattered cirrus deck over the field. Surface winds 180 at 11 altimeter 3003 over.

SPACECRAFT 3003 and roger the wind.

PAO 68000 feet at mach 1.6 range 40 miles.

PAO Columbia has just passed Truth or Consequences, crossed over interstate highway 25 heading toward White Sands. minutes 40 seconds from touchdown. 60 000 feet mach 1.4. Everything looking good at Mach 1 at 50,000 feet range 27 miles.

CAPCOM Columbia, Houston reminder on the speedbrake, 10(percent.

SPACECRAFT Okay I got them.

PAO Mach .9 and speedbrakes going to 100 percent now. 3 1/2 minutes from touchdown. 38,000 feet. Range 20 miles.

Columbia is coming aboard 285.

We reading 33 Dick.

Okay. A little low then.

PAO 30,000 feet. Everything looking good. Airspeed 285.

CAPCOM Columbia is intersecting the HAC now, passing 26,000 looks good.

PAO 2 1/2 minutes to touchdown. 13 miles range turning right now into runway 17 at 20,000 feet airspeed 295, range 10 miles.

CAPCOM Columbia, Houston winds 190 at 14.

SPACECRAFT ...here you go.

PAO Out of 15,000 feet.

Tip up your lights Houston.

PAO Air speed 275...

CAPCOM Columbia, Houston go for auto to enter glide slope.

PAO Go for auto at 12,000 feet.

SPACECRAFT Okay we're in auto, Houston.

PAO Columbia now in auto land. Out of 10,000 feet at 288, body flap's in trail..

SPACECRAFT ...(garbled)

CAPCOM Roger.

PAO 5,000 feet. Airspeed to 280. Range about 3 miles.

SPACECRAFT Preflare.

CAPCOM Roger.

PAO A thousand feet. Air speed 292. Still in auto.

CAPCOM 50 feet keep coming.

PAO ...comes the gear.

Gear down. 20.

10, 5 4 , touchdown.

No (garbled) tenths. (garbled) 5, 4, 3, 3, touchdown. (garbled)

(Applause) Alright!

PAO The Mission Elapsed Time of touchdown unofficiall is 8 days 0 hours 4 minutes 49 seconds.

SPACECRAFT Okay, wheels are stopped, Houston.

CAPCOM Okay Columbia, welcome home that was a beautiful job.

SPACECRAFT Copy.

PAO Unofficial wheel stop time 8 days 0 hours 6 minutes 10 seconds.

CAPCOM Hello convoy 1, this is Columbia how do you read.

CONVOY ONE Convoy 1, Columbia, read you loud and clear, how me? Welcome home.

SPACECRAFT Well I think we're booming right over the Commande in Chief's ranch right now, Steve.

CAPCOM Roger. Energy and ground track are nominal.

PAO We show them crossing the coast line now.

CAPCOM Columbia, Houston standby for a mark at 12.

CAPCOM Standby. Mark. 12,000 feet per second.

PAO Altitude 167 thousand feet, range 440 miles. We have AOS at White Sands now. 12 minutes to touchdown. Passing through 162,000 feet, range 410 miles, mach 10.6. Should be crossing the border into the United States about now. At 156,0(feet.

SPACECRAFT Speedbrakes are coming out.

CAPCOM Roger.

PAO 350 miles to White Sands. 150,000 feet.

SPACECRAFT Okay looks like we're going right over Phoenix at mach 9 at 150,000 feet.

CAPCOM Roger, that checks.

PAO Passing Phoenix. Altitude now 147,000 feet mach 8.3, range 290 miles. Still right on ground track, right on energy.

SPACECRAFT Okay Steve, we're passing Davis mountain I can se(it down there. I got one check, (garble) TACANs 1.

CAPCOM Roger standby.

PAO 135,000 feet. Mach 7. Range 230.

SPACECRAFT TACANs are good onboard and 1/10 for a ratio.

CAPCOM Roger, Columbia, Houston take TACAN.

SPACECRAFT It's taken.

PAO Columbia has a go for TACANs to help provide rang(and bearing information. 124,000 feet now. Mach 6.2, range 18(miles. Approaching the stateline between Arizona and New Mexic(now.

SPACECRAFT (garbled)

CAPCOM Roger.

PAO Control looks solid at 112,000 feet, mach 5, range 146 miles. Columbia is over New Mexico now. Passing north of Silver City. Altitude is 103,000 feet at Mach 4.3, range 112 miles. 7 1/2 minutes to touchdown.

SPACECRAFT Looks like TACAN 2 had a momentary hiccup there ar fell out and I'll just leave it alone.

CAPCOM Copy that. Passing 97,000 now, positive seats.

PAO Positive seats means the crew could use ejection seats if necessary. They are now below the altitude...

(garbled)

CAPCOM Roger.

PAO Out of 90,000 feet at Mach 3, range 74 miles.

SPACECRAFT Air data looks good onboard.

CAPCOM Standby. Columbia, Houston. Take air data.

PAO Columbia taking air data now at 81,000. We have a television picture of Columbia on the monitors. 79,000 feet, Mach 2.5, range 58 miles.

CAPCOM Columbia, Houston. Nav energy and ground track ar all good. Have an update on winds and weather when you're ready

SPACECRAFT Go ahead. It's a little bumpy around Mach 2.

CAPCOM Roger, high scattered cirrus deck over the field. Surface winds at 180 at 11. Altimeter 3003. Over.

SPACECRAFT 3003 and roger the wind.

END OF TAPE

PAO This is Shuttle Control, Columbia entering the Earth's atmosphere now. 30 minutes 15 seconds from touchdown.

CAPCOM NASA 946, Houston

946 946, go.

CAPCOM We're about 3 minutes from a possible AOS in Hawaii, any updates?

946 No sir, I think everything is good here.

CAPCOM Okay, we assume you're going to be clearing the area 20 to 25 minutes before touchdown, which would be 5 to 10 minutes from now.

946 Okay, we're already holding up north.

CAPCOM Okay, very good. Thank you.

946 I mean up northeast.

CAPCOM Roger.

PAO This is Shuttle Control at 7 days 23 hours 37 minutes, mission elapsed time. Columbia approaching the range c the Hawaii tracking station. We're doubtful we're going to have communication through there, but we'll stand by.

CAPCOM Columbia, Houston through Hawaii.

PAO We're processing data through Hawaii.

CAPCOM Columbia, Houston through Hawaii, over.

SPACECRAFT Okay, we're hearing you through Hawaii. We got a (garble) of 2.7 and we're doing good, all is well.

CAPCOM Sounds good.

SPACECRAFT It's (garble) now, just as soon as we started picking up the atmosphere it started very lightly and now is brighter and brighter.

PAO EECOM confirms 3 good APUs from the data he saw. We're processing data again after the keyhole in Hawaii. Showi an altitude of 254,000 ft., a velocity of 24,367 feet per secon

CAPCOM Columbia, Houston still with you through Hawaii.

SPACECRAFT Okay, Houston, we got RCS check leaks on ..

CAPCOM Roger Columbia, those are false leak indications, over. Columbia, Houston, reselect those jets, over.

PAO We've had LOS at Hawaii. Next AOS 11 minutes 21 seconds. We're 24 minutes from touchdown. We have two C Band contacts and we're now 200,000 ft. MACH 17. Range to go, 874 miles. We're processing data.

CAPCOM Columbia, Houston through Buckhorn, configure AOS.

SPACECRAFT Okay, we're reading you loud and clear, we got the (garble) so far, and take a look at our ground tracking now please.

CAPCOM Roger, energy and ground track are good, and NAV i great, Jack.

SPACECRAFT That's good news, Steve, thank you.

PAO This is Shuttle Control, we had acquisition of signal more than 2 minutes earlier.

contact go ahead.

PAO More than 2 minutes earlier than the predicted end of black out. Columbia at 186,000 ft. now, Mach 15, range 677 miles. 14 minutes to touchdown.

SPACECRAFT This is really a beautiful flying machine, Steve.

CAPCOM That's great to hear, Jack, we show you passing Mach 14 at a 179,000 ft.

SPACECRAFT That's affirmative, we got the coast of California in sight, and we're about to go over LA in about Mach 16, correction about Mach 13. I think we're booming right over the commander in chief's ranch right now, Steve.

CAPCOM Roger, energy and ground track are nominal.

PAO We show them crossing the coast line now.

CAPCOM Stand by for a mark at twelve.

END OF TAPE

SPACECRAFT Roger.

CAPCOM Have a good one.

PAO This is Shuttle Control, Orroral has loss of signal, we expect Columbia to be in black out at Hawaii in about 16 minutes but we'll come up then and see whether we do get any communications. Columbia is 12 and 1/2 minutes away from entering the Earth's atmosphere. 42 minuteS,R45 seconds from touchdown. All systems and configurations looked good aboard Columbia as it passed out of range at Orroral. And Jack Lousma was given a go for maneuvers. These are the aerodynamic maneuvers he will perform at bearing MACH Nos. during the entry to gather information on the aerodynamic response of the orbiter. These will be commanded by both use of the stick by th commander and also by using the computer keyboard. At 7 days 23 hours 23 minutes, mission elapsed time, this is Shuttle Control Houston.

CAPCOM NASA 946, Houston.

946 946, go.

CAPCOM Okay, we're back with you with about 13 minutes or so, any updates?

946 Roger, we just made our last pass at the MLS, the MLS is working good, the TACAN's been working good, the whole period was nominal. Equivalent airspeed at touchdown was 195 ar we touched distance with 3590, and airspeed at 3,000 was 286. The speed brakes retract at 2500 ft. with the winds we had today.

CAPCOM Okay, that's good. Surface winds please.

946 150 at 10, is what they told us.

CAPCOM We copy that, and Columbia had a good burn.

946 Terrific.

PAO This is Shuttle Control. Columbia's ground track on this re-entry crosses the coast of Baja California Mexico, about 50 miles south of Encinada. Goes northeast across Mexico entering Arizonia about halfway between Yuma and Lukeville.

946 Houston, 946

CAPCOM Go ahead

946 20 knots .....land runway

PAO Between Phoenix and Tucson crosses right at Casa Grande, south of Superior, Arizonia turns to a heading slightly more to the east passing north of Clifton, Arizonia, and then passing into New Mexico north of Silver City. And coming across Truth or Consequences just prior to getting into the terminal area for the landing at White Sands. We're 8 and 1/2 minutes from entry interface, the touchdown clock is counting at 38 minutes 44 seconds, we'll come back up in about 11 minutes and see whether we will get communications through Hawaii. This is Shuttle Control.

946 Houston, 946 over.

CAPCOM Go ahead.

946 We do have some high scattered cirrus that's starting to move in on us? But I think they'll still be able to see the lake bed from like about 390.

CAPCOM Okay copy, high scattered cirrus.

946 Broke these down to about 80 miles.

CAPCOM Okay.

PAO This is Shuttle Control, Columbia entering the Earth's atmosphere now. 30 minutes 15 seconds from touchdown.

CAPCOM NASA 946, Houston.

946 946, go.

CAPCOM We're about 3 minutes from a possible AOS ..

END OF TAPE

CAPCOM Columbia Houston, we're 30 seconds LOS now. Next is Yarragadee in 14 and 1/2 minutes. Have a good burn.

SPACECRAFT Roger, okay, Yarragadee we're in the burn with you.

PAO This is Shuttle Control. Columbia heading out ove the Indian Ocean now. Yarragadee's next in 13 and 1/2 minutes and we're 15 minutes 18 seconds away from deorbit. At 7 days 22 hours 58 minutes mission elapsed time this is Shuttle Control Houston.

CAPCOM NASA 946, Houston.

NASA 946 946 go.

CAPCOM Roger, we've got about 11 minutes here John. Any updates?

NASA 946 Wait one. Winds are 150 at 6 and 1/2.

CAPCOM Sounds good. NASA 946, Houston. Leaving you now. Talk to you again at 9 22.

NASA 946 Okay.

PAO This is Shuttle Control at 7 days 23 hours 10 minutes mission elapsed time. Columbia is 40 seconds away from acquisition through Yarragadee. 2 minutes 26 seconds from deorbit.

CAPCOM Columbia Houston through Yarragadee for 7 minutes standing by.

SPACECRAFT Okay, Houston, we're in the burn attitude, we've got the visual air press and all is well.

CAPCOM Roger.

PAO One minute to deorbit. 30 seconds.

SPACECRAFT Ignition, Houston. We got a good burn going.

CAPCOM Roger.

PAO Jack Lousma confirms ignition and a good burn going. Duration of this burn 2 minutes 29 seconds.

SPACECRAFT Nice shallow burn so far, Houston.

CAPCOM Roger.

SPACECRAFT Perigee 85. Good burn Houston. We got cut off. Residual's . 2 7, .0 1, .0 7 all minus.

CAPCOM Very good, Jack.

PAO Lousma confirms good burn. Columbia now committed to leave orbit.

SPACECRAFT And Houston, if you're still there. The APU 1 started up just fine and is sitting there chugging along.

CAPCOM We copy, very good. One and 1/2 minutes left in this pass, Gordo.

SPACECRAFT Sounds good.

CAPCOM And Columbia, the weather at Northrup is excellent. The surface winds are nearly calm at this point. 30 seconds LOS. Next is Orroral in 2 minutes.

SPACECRAFT Okay, we'll see you at Orroral Steve.

PAO This is Shuttle Control. Yarragadee has loss of signal and Orroral will pick up Columbia in 50 seconds for a 2 minute pass. That's the last time we'll see Columbia until afte blackout ends. Columbia now heading toward Northrup Strip at White Sands, New Mexico. Touchdown 46 minutes from now.

CAPCOM Columbia Houston through Orroral Valley for 2 minutes. Configure AOS.

SPACECRAFT Yea, we got you all clear.

CAPCOM Roger. Columbia Houston, you are go for maneuvers. A reminder to close the vent doors and remain configured AOS through the entry, over.

SPACECRAFT Roger, go for maneuvers and close vent doors and wait through the entry.

CAPCOM That's affirm. We're 30 seconds LOS. We may pic you up a little bit in 15 minutes in Hawaii, if not we'll see yc in 23 minutes over the states.

SPACECRAFT Roger.

CAPCOM Have a good one.

PAO This is Shuttle Control. Orroral has loss of signal. We expect Columbia to be in blackout in Hawaii in about

16 minutes but we'll come up then and see whether we do get any communications. Columbia is 12

END OF TAPE

CAPCOM 946, Houston. We'll sign off now. We'll pick you up after the DAKAR pass at 8:44 local.

NASA 946 946 off.

PAO This is Shuttle Control at 7 days 22 hours 35 minutes Mission Elapsed Time. Columbia about 30 seconds away from acquisition through DAKAR. We'll standby.

CAPCOM Columbia, Houston through DAKAR for 6 minutes, over.

SPACECRAFT Okay, hearing you loud and clear through DAKAR. How me Steve?

CAPCOM Got you loud and clear, Jack.

SPACECRAFT We're okay. We're getting suited up here and getting our hats on, that is and looks like we're right in the timeline.

CAPCOM That sounds great and when you have some free moments, we'll talk a little bit more about the winds and the weather at Northrup.

SPACECRAFT Okay, I'm helping Gordo get his hat on here.

SPACECRAFT Okay, go ahead with the winds and the weather at Northrup.

CAPCOM We believe the winds aloft are about the same as w gave you on the PAD if there are any updates I'll get those to you a little later. The surface winds are remaining out of the south. I believe I read to you earlier 160 at 10, they did have one gust to 26 knots but it was out of the south and they are prevailing at 7 to 10 knots. John has flown some passes with a right turn to 17 and his recommendation is that you follow guidance the tail wind may tend to overshoot you slightly on final but guidance will get you back just fine, however, he does recommend leading the speedbrake per the message at .95 getting it to manual and matching autos command then at .9 mach get it t 100 percent. Over.

SPACECRAFT Okay, remember that and I'll do it. And if you se me to do it differently you let me know.

CAPCOM Okay.

PAO This is Shuttle Control on the monitor in the newscenter. This is the operations area at Northrup Strip with the stiff legged derrick in the background.

SPACECRAFT And Steve, how is the MLS working today.

CAPCOM MLS is checked out and working fine, Jack.

SPACECRAFT Okay, we'll standby for your go to auto if 17 remains the selection.

CAPCOM That's affirm and all the other nav aids are looking good too.

SPACECRAFT Okay that's real good news, thank you.

CAPCOM Columbia, Houston we're 30 seconds LOS next is Botswana at 11 minutes.

SPACECRAFT Okay see you at Botswana.

PAO This is Shuttle Control. Columbia is out of range at DAKAR. Passing down over Africa. Next acquisition through Botswana in 10 minutes. Jack Lousma reporting the crew is right on the timeline counting down to deorbit in 29 1/2 minutes. We updated the weather at Northrup for them on this pass. Inquired about the microwave landing system that enables the autoland capability. John Young reported that working great on his approach to runway 17.

CAPCOM NASA 946, Houston.

PAO At 7 days 22 hours 44 minutes Mission Elapsed Time this is Shuttle control.

CAPCOM Roger, we're between DAKAR and Botswana now. We've got about 8 minutes.

NASA 946 Roger.

PAO This is Shuttle Control. The monitors in the newscenter are now displaying the convoy briefing...

NASA 946 Okay the winds right now are (garble) knots, so I'll cal it still good.

CAPCOM Copy that, thank you.

CAPCOM NASA 946, Houston. We're signing off, we'll be back with you at 8:58.

NASA 946 See you.

PAO This is Shuttle Control at 7 days 22 hours 53 minutes Mission Elapsed Time. Botswana will acquire Columbia in 30 seconds.

CAPCOM Columbia, Houston through Botswana for 3 1/2 minutes, over.

SPACECRAFT Okay, hear you through Botswana. And we are maneuvering through the verniers a little bi early. Hope you don't mind.

CAPCOM Not at all.

CAPCOM Gordo, one reminder, if you should get some mulitple leak messages on the primary jets, that's probably fals a fail indication due to those low fuel injector temps we talked about before and you'd want to reselect those jets. Over.

SPACECRAFT (garbled) very good. A possible same thing on the primaries you're saying.

CAPCOM And that's affirm, Gordo.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, we're 30 seconds LOS now, next is Yarragadee in 14 1/2 minutes. Have a good burn.

SPACECRAFT Roger, we'll see you at Yarragadee (garbled).

END OF TAPE

SPACECRAFT (garble) number 1 number 2 back up.

CAPCOM Gordo, we're not receiving you bio med, Jack's okay, you might check it Gordo, if you have a chance.

SPACECRAFT Well I assure you, I'm still here, it's plugged in and I don't know what the problem is.

CAPCOM Roger.

PAO This is Shuttle Control here in the control center. Flight Director Harold Draughon's taking a go no go status for the orbit.

SPACECRAFT (garble) top sun attitude look okay?

CAPCOM Looks good Jack, I have one thing for Gordo, on panel R1 we need the cryo tank 3 heaters off, please.

SPACECRAFT Okay, the tank 3 heaters are off. Wait a minute, that say again.

CAPCOM And Gordo, we also need a GPC CRT 33 execute to get GPC 3 driving CRT 3, over.

SPACECRAFT Okay, it's in there. And what time of a turn are you betting on for 23 at this point, Steve?

CAPCOM Okay Jack, first of all you are go for the deorbit burn, and we talked to the STA just before your CONUS pass and the winds right now are favoring runway 17 with a right turn, the surface winds last reported were 160 at 10 knots, so we recommend a right turn to runway 17, and if the winds should happen to pick up and swing around as forecast, we may have to switch back to 23, and we do not anticipate that at this time.

SPACECRAFT Okay, we're on select runway 17 item 4 with right hand turn.

CAPCOM Okay, that sounds good. Should we have to return to runway 23, the right or left turn is about even on G's on the turn and the turn angle around the HAC is almost the same either way, so it's your call, a right or left turn should we go back to 23.

SPACECRAFT Okay, If it's either way in that case, we'll take a left turn to 23.

CAPCOM Sounds good, left turn. And Columbia, Houston, check the roll attitude, we think you're about 10 degrees out.

SPACECRAFT Okay, what way you want to go?

CAPCOM Roll right.

SPACECRAFT Okay, we'll roll right 10 degrees to 155.

CAPCOM Roger.

SPACECRAFT Let's bring it a roll the other way too, about 185.

CAPCOM And Columbia, Houston we're 30 seconds LOS, next is Dakar in 5 and 1/2 minutes, over.

SPACECRAFT Okay Steve, we'll see you then.

CAPCOM Roger.

PAO This is Shuttle Control, Bermuda has loss of signal. Columbia heading down toward Dakar now, 4 and 1/2 minutes away from acquisition there.

CAPCOM NASA 946, you ....

PAO The next 3 stations are UHF stations, we'll have no telemetry data at Dakar, Botswana or Yarragadee. We're 41 minutes away from deorbit which will occur 2 minutes into the Yarragadee pass.

CAPCOM NASA 946, Houston.

946 946, Go

PAO During this last orbit over the United States, Gordon Fullerton reported looking straight down on White Sands and said it looked much better today than yesterday.

CAPCOM (garble)

946 It's much the same as near as we can tell and the surface winds that we reportd are not changing.

PAO Columbia has a go for deorbit, and a right turn to runway 17.

946 Because they were running about 7 or 8 knots there for a long time. And then we had a report of a gust of 26, so I think we ought to probably stay with 17, cause the 26 knot gust was out of the south.

CAPCOM Alright, we copy that. And we did recommend to them a right turn to 17, so that's what they're planning on.

946 Okay.

CAPCOM 946, Houston, we'll sign off now, we'll pick you up after the Dakar pass at 8:44 local.

946 946, so long.

END OF TAPE

CAPCOM ...301 if you would please.

SPACECRAFT Okay.

SPACECRAFT Okay, how's that Steve?

CAPCOM Standby. Okay that worked good Jack, thank you.

SPACECRAFT Okay you might want to load that up for us.

CAPCOM Roger, will do.

CAPCOM And Columbia, Houston. At your convenience we're ready for the APU prestart followed by the gimbal check.

SPACECRAFT Ah, Gordo's getting his hat on, how about if I give you the gimbal check and then give you the prestart.

CAPCOM That will be fine.

SPACECRAFT Okay here come the secondary gimbals at you.

CAPCOM Roger.

SPACECRAFT Houston, Columbia.

CAPCOM Roger go ahead, Gordo.

SPACECRAFT I got my (garble) here, I'm ready to open the tank valves if you are.

CAPCOM Roger, we're ready Gordo.

CAPCOM Columbia, Houston. The gimbal check looks good and you can reload the targets primary and backup, over.

SPACECRAFT Okay. Okay, we're looking straight down at Northrup. It looks a lot better today than it did yesterday.

CAPCOM And it is a lot better there Gordo. The APUs look good and you can secure the tank valves.

SPACECRAFT Okay the tank valves are closed I had three gray when they were open.

CAPCOM Roger thank you.

SPACECRAFT And it's kind of interesting, the attitude and everything put us absolutely (garbled) at 12 o'clock at Northrup.

CAPCOM Gordo, as a result of having programmed the BFS to

OPS 0 you're going to have to reload the mini-table again and we have those item numbers for you if you want.

SPACECRAFT Okay I'll get it. I'll take them from you in just a minute though.

CAPCOM Okay that's on spec 51 of the BFS.

SPACECRAFT Okay go ahead with that in 6.

CAPCOM Roger item 6 +17

SPACECRAFT Okay.

CAPCOM Item 7 +2

SPACECRAFT Okay.

CAPCOM Item 8 +18

SPACECRAFT Say again, you broke up

CAPCOM Roger that was item 8 +18, 18 over.

SPACECRAFT ...one more time.

CAPCOM Okay Gordo, item 8 + 1 8 over. Gordo, did you copy the item 8 + 18.

CAPCOM Columbia, Houston how do you read.

CAPCOM Columbia, Houston how do you read.

CAPCOM Columbia, Houston through MILA for 9 minutes over.

SPACECRAFT Okay we hearing you now and we got it reloaded, reloaded to BFS.

CAPCOM Roger. Did Gordo copy my last item 8 +18 on spec 51, over.

SPACECRAFT That's a negative. But we looked it up and we got it in there correctly.

CAPCOM Roger.

SPACECRAFT And take a look at our targeting and our solution that makes it okay, would you please, Steve.

CAPCOM Roger, Jack. We need you to reload the targets and the CRT timer. Over.

SPACECRAFT Say again, please.

CAPCOM We need you to reload the targets, over.

SPACECRAFT In the the pass or the BFS.

CAPCOM In both, Jack.

SPACECRAFT Oh you mean we've got to type them all over again.

CAPCOM That's negative, just the item 22 and 23, Jack.

CAPCOM And Jack, that's just into the pass, the BFS will DK listen.

SPACECRAFT Okay.

SPACECRAFT Okay, take a look at them now, Steve.

CAPCOM Roger, we'll take a look, a couple of more things. We need you to terminate the interconnect at this point, Jack.

SPACECRAFT Okay, I was just about to get to that.

CAPCOM And Gordo, as yesterday, your APU for pre TIG start is number 1 with number 2 as a backup, over.

SPACECRAFT Okay number 1, number 2 backup.

END OF TAPE

NASA 946 ...5000 AGL right now.

CAPCOM Copy.

NASA 946 That's in the Shuttle Training Airplane. I don't even think the orbiter will notice that.

CAPCOM Copy.

CAPCOM 946, on that last run did you have a read out of the winds at 2000 and 7000 and 10,000.

NASA 946 2000 was 200 at 15, 7000 275 ... 43, 10,000 was 270 at 50.

CAPCOM Copy that, thank you.

NASA 946 I think that wind is probably going to hang in there somewhere between 5 and 15 knots and it's just going to be chancy to go for the crosswind, you may get it and you may not. I, I guess I would tend to recommend going for the autoland. But, if it hangs in there at 10 knots you can get the crosswind.

CAPCOM We copy that.

NASA 946 I don't know how late you want to change that runway.

WHITE SANDS Houston, White Sands, air to ground 2.

CAPCOM Houston, go ahead.

WHITE SANDS Okay you're loud and clear.

CAPCOM Roger, you're 5 by also.

PAO This is Shuttle Control. The television picture on the monitors in the newscenter from a helicopter showing the approach end of runway 17 at Northrup Strip. The convoy deploying is visible now on the monitors about mid way on the picture. Monitor now shows the Shuttle Training Aircraft piloted by Astronaut John Young making the approach to runway 17.

CAPCOM NASA 946, Houston.

NASA 946 Just coming up on 7 touchdown to 17. Standby.

CAPCOM Roger.

NASA 946 947 go.

CAPCOM Houston, 946 we're standing by.

NASA 946 Roger, we just completed that pass using the MLS. The MLS works great. We took it down to 100 feet and I'll give you some numbers here soon as we get them.

CAPCOM Roger.

PAO The picture on the monitor now shows the convoy with the operations area in the background.

NASA 946 Okay the airspeed at 3,000 was 284 knots touchdown airspeed was slow 180. The touchdown x distance was 4480 feet and the wind was 160 at 10.

CAPCOM We copy that. 160 at 10.

NASA 946 And there's a little turbulence down in that area but, it's I don't think the orbiter will notice it.

CAPCOM All right John and your recommendation remains a right turn to 17 over.

NASA 946 That's right.

NASA 946 What's the latest time you can change to 23 if the winds pickup.

CAPCOM Standby John. John, we can do it at Orroral post burn or immediately post black out.

NASA 946 Okay we'll just keep watching the surface winds. That will be the criteria.

CAPCOM Okay thank you. We're signing off here. We'll try to talk to you after the CONUS pass at 8:32 Houston time.

NASA 946 Yes sir.

PAO This is Shuttle Control at 7 days 22 hours 12 minutes Mission Elapsed Time. Standing by for acquisition of Columbia through Buckhorn on orbit 129. Columbia, now 1 hour from deorbit.

CAPCOM Columbia, Houston through the states for 17 minutes. Over.

SPACECRAFT Okay we read you loud and clear Steve. How us?

CAPCOM Got you 5 by Jack. The BFS is on internal time right now. We would like you to pro it to ops 0 then back to 301 if you would please.

SPACECRAFT Okay.

END OF TAPE

PAO This is Shuttle Control, Orroral will pick up Columbia in about a minute and a half.

CAPCOM Columbia, Houston through Orroral Valley for 4 minutes, over.

PAO Okay, loud and clear, and I'll configure the AOS.

CAPCOM Roger, copy that. On this pass, for you I have the site coverage explanation pass the CONUS.

SPACECRAFT Okay we're ready.

CAPCOM Okay Gordo, the next CONUS pass coming up is the last one with data before the burn, so we do need to do the APU pre-start and the gimbal check over the States. Past the CONUS instead of Asension we will go over Dakar with no data, then we'll have a Botswana pass and then TIG for the burn will occur over Yarragadee 2 minutes into that pass. After the burn, we'll have 2 minutes across Orroral Valley again, and there will be no Guam pass. But, we will go over Hawaii, but you will be in black out at that time, so we may or may not have COMM with you there, so the last COMM pass, prior to the States on entry we can count on, will be Orroral Valley, over.

SPACECRAFT Okay, I understand that Steve, and you'll have the runway selection and the turn recomendation at that point, is that corrrect?

CAPCOM That is correct, and hopefully before that Jack.

SPACECRAFT Okay, thank you.

CAPCOM Columbia, Houston coming up on LOS, a reminder back on panel A11 we need the cryo tank 4 heaters off, and on panel R11, check the wideband mission power on, over.

SPACECRAFT Okay, I happen to be going through my switch check right now and I do have all the cryo tank 4 heaters off, and say again the wideband power on?

CAPCOM Panel R11, wideband mission power to on, ON, we're coming up LOS we'll pick you up next at Buckhorn in 23 minutes.

SPACECRAFT Wideband, mission power's on.

PAO This is Shuttle Control. Columbia's out of range of Orroral Valley now. Coming up on the end of orbit 128, Columbia will begin orbit 129 about halfway between Orroral and Buckhorn. Buckhorn acquisition in 22 and 1/2 minutes. It's 1 hour 22 and a half minutes to the deorbit burn. At 7 days 21 hours 50 minutes, mission elapsed time, this is Shuttle Control

Houston.

CAPCOM NASA 946, Houston.

946 We're coming out of 13 MFL Houston, we're on a sim run to 23 and we'll let you know what we see on (garble).

CAPCOM Roger, standing by.

946 Houston, 946 over.

CAPCOM Roger, we're ready to copy, go ahead.

946 The wind is not strong enough to do the crosswind right now and I don't think it's, if it goes up it's not going to be, I think I told you wrong on that, leading the right hand turn in, I think you ought to follow guidance in the Shuttle, and you know and play the speed brakes to maintain your energy. Maybe leading the speed brakes, just like we talked about, but I think you ought to follow guidance on that right hand turn, and if you have to you overshoot and come back. That's my recommendation.

CAPCOM Okay, we copy that. What are the surface winds now that you recorded?

946 155 at 6 knots.

CAPCOM Copy 155 at 6 knots. 946 are you still experiencing that sheer level at about 2,000 ft. or is it moving up or down now?

946 Well we got slight to moderate turbulence all the way up to 5,000 AGL right now.

CAPCOM Copy.

946 And that's in the shuttle training airplane, I don't think the orbiter will notice that.

CAPCOM Copy.

END OF TAPE

NASA 946 ...and it worked out just fine, but it looks like the surface wind is increasing. Right now it's 170 10 to 12 and if it keeps doing that, well we probably ought to look at 23 for the crosswinds.

CAPCOM We copy that. Any amendment to the winds aloft.

NASA 946 No, you've got them all.

CAPCOM Roger.

NASA 946 There's uh, down around preflare right at 2,000 feet there's an area where the wind sheer goes from about 8 knots to about 22 or 23 knots and an area of moderate turbulence there.

CAPCOM Okay, copy that. Wind sheer at around 2,000 feet.

NASA 946 All right it's a moderate turbulence. I bet the orbiter won't even notice it.

CAPCOM Roger. Would you recommend leading the turn onto the hack for a right turn to 17.

NASA 946 I think you can do it staying with the guidance if you lead it a little bit, because that wind from 250 at 100 tends to throw you around the corner there.

CAPCOM Roger.

CAPCOM 946, Houston. Will you be making your next approach to runway 23.

NASA 946 Yes sir, but we're going to hold up here for a little while.

CAPCOM Roger. Copy that. We'll call you next time after Orroral John at about 7:51 local.

NASA 946 Okay. See you later.

NASA 946 Houston, there are no clouds out as far as we can see which must be at least 200 miles out to the west.

CAPCOM Copy.

PAO This is Shuttle Control. That was another report from Astronaut John Young in the Shuttle Training Aircraft over Northrup Strip. Reporting visibility unlimited. He's flown an approach with a right hand turn to runway 17. Believes that's doable. He recommends leading the turn somewhat because of winds, but experienced no particular problems. Moderate turbulence about 2000 feet. He'll make a run later on to runway

23 and we'll talk to him again after Orroral LOS. Columbia is 6 minutes away from acquisition through Yarragadee. At 7 days 21 hours 32 minutes Mission Elapsed Time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 7 days 21 hours 36 minutes Mission Elapsed Time. Shuttle approaching acquisition through Yarragadee.

CAPCOM Columbia, Houston through Yarragadee for 6 minutes over.

SPACECRAFT Okay we're hearing you loud and clear through Yarragadee and how's it read down there.

CAPCOM Got you 5 by Jack.

SPACECRAFT Okay we're back in the top sun attitude at little bit early and I know you won't mind so we can get on with the IPS transitions.

CAPCOM Okay good copy and sometime over Yarragadee or we have a little bit of Orroral here, we might discuss with you the site coverage past the CONUS on your last pass when you have time.

SPACECRAFT Standby one please.

CAPCOM Columbia, Houston. We're 30 seconds LOS. We'll pick you up at Orroral Valley in 2 minutes.

SPACECRAFT Okay (garble)

PAO This is Shuttle Control. Orroral will pick up Columbia in about a minute and a half.

END OF TAPE

CAPCOM Columbia, Houston we're 30 seconds to LOS. Now, next is IOS in 13 minutes and we had some uplink problems last time. You may expect some UHF uplink problems with this next one.

SPACECRAFT Okay.

PAO This is Shuttle Control. Loss of signal at Madrid with Columbia moving out over Africa toward the Indian Ocean Station in 12 1/2 minutes. Crew given a go for ops 3, that's transition to the computer program for entry and landing. We're 2 hours 4 minutes away from the deorbit burn. At...Mission Elapsed Time of 7 days 21 hours 9 minutes. This is Shuttle Control Houston.

CAPCOM NASA 946, Houston we're back with you for about 11 minutes.

NASA 946 Houston, 946 go ahead.

CAPCOM Roger, John we're back with you for about 11 minutes. We'll just standby.

NASA 946 Roger. And I'd like to remind you that the winds are in true degrees and that's above ground level.

CAPCOM Copy that.

NASA 946 And, Houston. 946 reporting the winds at 35,000 260 to 130 at 39,000 250 at 110. That's above ground level.

CAPCOM Houston copies.

CAPCOM NASA 946, Houston. We're going to sign off here. We'll pick you up next after our IOS pass at about 7:27 Houston time.

NASA 946 Okay. 946 copy. Thanks a lot. We're in a run right now we'll let you know what we think.

CAPCOM Thank you.

PAO This is Shuttle Control at 7 days 21 hours 20 minutes Mission Elapsed Time. Columbia is approaching acquisition through the Indian Ocean Station.

CAPCOM Columbia, Houston through IOS for 5 minutes over.

SPACECRAFT Okay, read you loud and clear through IOS. (garbled)

CAPCOM Roger.

CAPCOM Columbia, Houston, we're 30 seconds LOS. Next is Yarragadee in 12 minutes over.

CAPCOM NASA 946, Houston.

NASA 946 946 go ahead.

CAPCOM Roger we're back with you for about 10 minutes and ready to copy.

NASA 946 Okay, we just made our first pass with the right hand turn into 17 and the wind really pulls you around the curve and you tend to overshoot and but, it certainly looks good and feasible to do. We're carrying full speed flaps in the orbiter that's 25,000 foot wind 260 at 100 is what gets you going around the corner there. And, it worked out just fine but it looks like the surface wind is increasing. Right now it's 170 10 to 12 and if it keeps doing that, we probably ought to look at 23 for the crosswinds.

CAPCOM We copy that. Any amendment to the winds aloft.

NASA 946 Oh you got them all.

CAPCOM Roger.

NASA 946 There's ah, down around the preflow right at 2,000 feet there's an area where the wind sheer goes from about 8 knots to about 22 or 23 knots and.....

END OF TAPE

CAPCOM COLUMBIA, HOUSTON, WE'RE 30 SECONDS LOS. NEXT IS MADRID IN 6 MINUTES. SEE YOU THERE.

SPACECRAFT OKAY.

PAO THIS IS SHUTTLE CONTROL. BERMUDA HAS LOSS OF SIGNAL. MADRID IS NEXT IN 5 1/2 MINUTES. DURING THIS PASS THE CREW WAS GIVEN THE PAD FOR THE DEORBIT BURN. THE DELTA V, THE CHANGE IN VELOCITY OF THAT BURN, 270.7 FEET PER SECOND. DURATION OF THE BURN, 2 MINUTES, 29 SECONDS. TARGETING TOWARD RUNWAY 23 AT NORTHRUP WITH A LEFT-HAND TURN. AT 7 DAYS, 20 HOURS, 58 MINUTES MISSION ELAPSED TIME THIS IS SHUTTLE CONTROL HOUSTON.

JOHN YOUNG 946 IS WITH YOU AT NORTHRUP NOW.

CAPCOM OKAY. SORRY. 946. JOHN HAVE YOU FLOWN ANY PATTERNS OR ARE YOU JUST GETTING OUT THERE?

JOHN YOUNG JUST PASSING 35,000 ON THE WAY UP AND THE WINDS LOOK PRETTY CLOSE TO A FORECAST WIND SO FAR.

CAPCOM ROGER. IF YOU DO HAVE ANY NUMBERS TO PASS TO US, WE'LL COPY AND THEN GET BACK WITH YOU AT A LATER TIME.

JOHN YOUNG 946 YOU DROPPED OUT THERE. SAY AGAIN.

CAPCOM ROGER. 946. IF YOU DO HAVE ANY WINDS TO PASS TO US, WE'LL COPY THEM NOW AND THEN I'LL GET BACK TO YOU LATER.

JOHN YOUNG OKAY. THE LAND SURFACE WIND WAS 170 AT 8, 2,000 FOOT 240 AT 20, 7,000 FOOT, 270 AT 43, 10,000 FEET 265 AT 53, 15,000 260 AT 69, 20,000 263 AT 76, 25,000 260 AT 100. 30,000 IS 260 AT 125.

CAPCOM COPY THAT.

JOHN YOUNG RIGHT NOW IT LOOKS LIKE A RIGHT-HAND TURN INTO 17. THE VISIBILITY IS CABU (CLEAR AND BEAUTIFUL) TO MARS. YOU CAN SEE ALMOST ALL THE WAY TO SAN FRANCISCO PEAKS AND IT'S CLEAR OUT AS FAR WEST AS WE COULD SEE.

CAPCOM OKAY JOHN. THAT SOUNDS VERY GOOD. THANK YOU. WE'LL CALL YOU AFTER THE NEXT MADRID PASS WHICH WILL BE ABOUT 7:08 HOUSTON TIME.

JOHN YOUNG YES.

PAO THIS IS SHUTTLE CONTROL. THAT WAS JOHN YOUNG IN NASA 946, ONE OF THE SHUTTLE TRAINING AIRCRAFT, NOW AIRBORNE OVER NORTHRUP STRIP PROVIDING WINDS ALOFT INFORMATION. HE WILL BE MAKING SOME APPROACHES TO THE RUNWAYS AT NORTHRUP AND PROVIDING RECOMMENDATIONS ON WINDS, THE BEST RUNWAYS, AND WHETHER RIGHT OR

LEFT-HAND TURNS ARE RECOMMENDED. WE'RE 2 MINUTES AWAY FROM ACQUISITION THROUGH MADRID. WE'LL STAND BY.

CAPCOM COLUMBIA, HOUSTON THROUGH MADRID FOR 3 MINUTES.

SPACECRAFT OKAY, (GARBLED) WE'RE WAITING FOR 4 MINUTES ON THE RADIATORS FLOW THROUGH TEST.

CAPCOM ROGER.

CAPCOM COLUMBIA, HOUSTON. THE VERNIER JET HEATERS HAVE BEEN POWERED OFF FOR SOME TIME NOW. THE INJECTOR TEMPS ARE DROPPING SO PRIOR TO OPS 3 TRANSITION YOU MAY TRIP THE THRESHOLD. NO ACTION REQUIRED IF YOU DO.

SPACECRAFT OKAY.

CAPCOM COLUMBIA, HOUSTON. THREE MINUTES LEFT IN THIS PASS. WE ARE NOT DOING THE DFI PCM RECORDER REWIND AND JUST A REMINDER TO USE THEM SPARINGLY.

SPACECRAFT THANK YOU,.

SPACECRAFT OKAY, I'LL BE BACK IN JUST A MINUTE, STEVE.

CAPCOM ROGER.

CAPCOM COLUMBIA, HOUSTON. YOU ARE GO FOR OPS 3 TRANSITION. OVER.

SPACECRAFT OKAY, GO FOR OPS 3.

CAPCOM COLUMBIA, HOUSTON. WE'RE 30 SECONDS TO LOS. NOW NEXT IS IOS IN 13 MINUTES AND WE HAD SOME UPLINK PROBLEMS THE LAST TIME. YOU MAY EXPECT SOME UHF UPLINK PROBLEMS WITH US NEXT TIME.

END OF TAPE

CAPCOM 085, 85, FORWARD RCS DELTA V, 06, DUMP TO OXIDIZER, 00, 10 NINER 5.1, ALL BALLS, READ THAT.

SPACECRAFT OKAY, 143, 072, 352, 122, MINUS 017, 270.7, 22 NINER, ALL BALLS, 200, 085, 085, 85, 06, ARCS, 00109.1, ALL BALLS.

CAPCOM ROGER, THAT, XCG WAS 10 NINER 5.1, AND I'LL PICK UP WITH EI MINUS 5 INERTIAL ATTITUDE, 213, 272, 024, RIGHT, 000, THERE IS NO GUAM AOS, OR LOS, ALTIMETER, 30.03, 233934, 17600, A LEFT HAND TURN, NORTHRUP RUNWAY 23. WINDS 250:60, 250:110, 265:120, 270:85, 270:40 AND THE SURFACE, 270:15, READBACK.

SPACECRAFT OKAY, I GOT 213, 272, 024, 3 BALLS, RIGHT 3 BALLS. BLANK BLANK, 30 03, 233 NINER 34, 17600, LEFT HAND TURN NORTHRUP 23, GUST OF WINDS.

CAPCOM THAT'S A GOOD READ BACK AND JACK WE'LL WATCH THE WINDS REAL TIME. IF THEY DON'T DEVELOP TO BE AS STRONG AS FORECAST, YOU MAY BE THINKING ABOUT THE RUNWAY 17 OPTIONS ALSO. AND I WILL ALSO, LATER DISCUSS WITH YOU THE GROUND TRACK SITE COVERAGE FOR THE LAST ORBIT AND ENTRY BECAUSE IT IS DIFFERENT.

SPACECRAFT ALRIGHT, THEN WE MIGHT ALSO BE THINKING ABOUT RIGHT HAND TURNS, IT LOOKS LIKE.

CAPCOM THAT'S AFFIRM, AND I'M READY ON THE MANEUVER PAD WHENEVER YOU ARE.

SPACECRAFT GO AHEAD ON THE MANEUVER PAD, STEVE.

CAPCOM ROGER, OMS BOTH, EV ROLL, 180 PLUS 0.1 MINUS 5.7 PLUS 5.7, 214 76 NINER, 007, 2313 30.0, 15456 MINUS 0.6222, 065.832, 086.106, ALL BALLS, DELETE PAGE 7, READ BACK.

SPACECRAFT OKAY, STEVE, CAN YOU REPEAT THE THEATA T.

CAPCOM THEATA T IS 086.106, OVER.

SPACECRAFT OKAY, WE COPY. OMS BOTH, EV ROLL 180 PLUS .1, MINUS 5.7, PLUS 5.7, WEIGHT IS 21476 NINER, SEVEN AS, 2313 30.0, C1, 15456, MINUS 0.6222, 065.832, 086.106, 0 ON THE PROPELLANT, DELETE PAGE 7.

CAPCOM THAT'S A GOOD READ BACK. CONTINUING WITH BURN ATTITUDE. 143, 072, 352, 4156, 1840, DELTA V TOTAL, 0270.7, 022 NINER, VGOS X PLUS 0260.60, Y IS ALL BALLS, Z PLUS 073.43, TARGET HA AND HP, 122 AND MINUS 017, READ BACK.

SPACECRAFT WE COPY BURN ATTITUDE, 143, 072, 352, 4156, 1840, 0270.7, 022 NINER, VGO X PLUS 0260.60, ALL BALLS, PLUS 073.43, HA 122 MINUS 017.

CAPCOM THAT'S A GOOD READBACK GORDON, 2 MINUTES LEFT IN THIS PASS.

SPACECRAFT THANK YOU.

CAPCOM COLUMBIA HOUSTON, WE'RE 30 SECONDS LOS, NEXT IS MADRID IN 6 MINUTES, SEE YOU THEN.

SPACECRAFT OKAY.

END OF TAPE

SPACECRAFT OKAY WE'LL SEE YOU TOMMORROW. WE'RE GETTING READY TO CLOSE THE DOORS.

CAPCOM OKAY AND WE CAN WATCH IT HAPPEN.

PAO THIS IS SHUTTLE CONTROL. YARRAGADEE HAS LOSS OF SIGNAL, ORRORAL VALLEY WILL PICK UP COLUMBIA IN ABOUT A MINUTE AND A HALF. JACK LOUSMA REPORTING THEY ARE BEGINNING TO CLOSE THE PAYLOAD DOORS. WE'LL STAND BY FOR ORRORAL.

CAPCOM COLUMBIA, HOUSTON THROUGH ORRORAL VALLEY FOR 4 MINUTES. OVER.

SPACECRAFT OKAY WE'RE HEARING YOU THROUGH ORRORAL AND WE'RE CLOSING THE PORT DOOR.

CAPCOM OKAY WE SEE THAT IN WORK.

PAO THIS IS SHUTTLE CONTROL. TELEMETRY SHOWS THE PORT DOORS CLOSED NOW. THIS IS SHUTTLE CONTROL THE STARBOARD DOOR IS CLOSED NOW.

CAPCOM COLUMBIA, HOUSTON 25 SECONDS LOS, WE SEE BOTH DOORS CLOSED AND THE BULKHEAD LATCHES SECURED AND A REMINDER TO GO TO TOP SUN ATTITUDE AND WE'LL SEE YOU NEXT THROUGH MILA IN 31 MINUTES.

SPACECRAFT OKAY.

PAO THIS IS SHUTTLE CONTROL. ORRORAL HAS LOSS OF SIGNAL. COLUMBIA STARTING OUT OVER THE PACIFIC OCEAN NOW TOWARDS THE CONTINENTAL UNITED STATES. WE SHOULD GET SOME COMMUNICATION THROUGH THE WHITE SANDS STATION ON THIS PASS IN 25 MINUTES, FOLLOWED BY MERRITT ISLAND AND FLORIDA. AT 7 DAYS 20 HOURS 17 MINUTES MISSION ELAPSED TIME. THIS IS SHUTTLE CONTROL HOUSTON.

PAO THIS IS SHUTTLE CONTROL AT 7 DAYS 20 HOURS 41 MINUTES MISSION ELAPSED TIME. STANDING BY FOR ACQUISITION THROUGH WHITE SANDS.

CAPCOM COLUMBIA, HOUSTON THROUGH THE STATES FOR 15 MINUTES. OVER.

PAO THIS IS SHUTTLE CONTROL WE BELIEVE THE CREW IS STILL SITTING UP, WE'LL HAVE COMMUNICATIONS WHEN THEY GET THEIR SUITS ON AND THEIR HEAD SETS REESTABLISHED.

CAPCOM COLUMBIA, HOUSTON THROUGH THE STATES FOR 12 MINUTES. OVER.

CAPCOM COLUMBIA, HOUSTON THROUGH THE STATES FOR 12 MINUTES. OVER.

CAPCOM COLUMBIA, HOUSTON, HOW DO YOU READ?

CAPCOM COLUMBIA, HOUSTON THROUGH THE STATES FOR ELEVEN MINUTES, HOW DO YOU READ? OVER.

SPACECRAFT (GARBLE)

CAPCOM COLUMBIA, HOUSTON, YOU'RE UNREADABLE, LETS WAIT TIL WE GET TO MILA HERE IN ANOTHER MINUTE OR SO.

SPACECRAFT WE'LL STAND BY.

CAPCOM COLUMBIA, HOUSTON, GO AHEAD.

CAPCOM COLUMBIA, HOUSTON THROUGH MILA FOR 9 MINUTES. OVER.

SPACECRAFT OKAY STEVE, I'M CLEAR.

CAPCOM GOT YOU FIVE BY, GORDO, I HAVE THE DEL PAD AND MANEUVER PAD ON THIS PASS.

SPACECRAFT OKAY STAND BY ONE.

CAPCOM ROGER.

SPACECRAFT OKAY WHAT KIND OF PADS HAVE YOU GOT THERE FOR US?

CAPCOM JACK I WILL START WITH THE DEL PAD BURN ATTITUDE WHEN YOU'RE READY.

SPACECRAFT OKAY GO AHEAD WITH THE DEL PAD, STEVE.

CAPCOM ROGER. BURN ATTITUDE, 143, 072, 352, 122, MINUS 017, 270.7, 229, ALL BALLS, 200, 085, 085, 85, FORWARD RCS DELTA V, 06 DUMP TO OXIDIZE, 00, 10 NINER 5.1, ALL BALLS. READ BACK.

SPACECRAFT OKAY 143 072 352 122 ...

END OF TAPE

CAPCOM GORDO, WE THINK THAT YOUR CLOSEST POINT WHICH IS COMING UP REAL SHORTLY HERE, YOU WILL BE BETWEEN 2 AND 300 MILES AND IT SHOULD BE TO YOUR SOUTHWEST.

SPACECRAFT OKAY. THAT'S GOING TO BE A LITTLE HARD TO SEE, LOOKS LIKE WE GOT CLOUDS.

CAPCOM COLUMBIA, HOUSTON. WE HAVE 2 MINUTES LEFT IN THIS PASS. YOU ARE GO FOR THE PAYLOAD BAY DOOR CLOSING ON TIME, AS PER THE MESSAGE, AND WE SURE WOULD RECOMMEND THAT YOU DO A MANUA CLOSING OF THE DOOR.

CAPCOM COLUMBIA, HOUSTON. WE'RE 1 MINUTE LOS. DID YOU COPY THE LAST TRANSMISSION?

CAPCOM COLUMBIA, HOUSTON. OVER.

CAPCOM COLUMBIA, HOUSTON. WE'RE 30 SECONDS LOS. YARRAGADEE IS NEXT IN 8 MINUTES AND IN THE BLIND YOU HAVE A GO FOR PAYLOAD BAY DOOR CLOSING. WE RECOMMEND MANUAL CLOSING.

PAO THIS IS SHUTTLE CONTROL. THE INDIAN OCEAN STATION HAS LOSS OF SIGNAL. NEXT ACQUISITION WITH COLUMBIA THROUGH YARRAGADEE IN 8 MINUTES. CREW HAS BEEN GIVEN A GO TO CLOSE THE PAYLOAD BAY DOORS. IT'S 7 DAYS, 19 HOURS, 55 MINUTES MISSION ELAPSED TIME. THIS IS SHUTTLE CONTROL HOUSTON.

PAO THIS IS SHUTTLE CONTROL AT 7 DAYS, 20 HOURS, 2 MINUTES MISSION ELAPSED TIME. COLUMBIA APPROACHING ACQUISITION THROUGH YARRAGADEE. WE SHOULD GET A REPORT HERE ON THE PAYLOAD BAY DOOR CLOSING.

CAPCOM COLUMBIA, HOUSTON THROUGH YARRAGADEE FOR 7 MINUTES. OVER.

SPACECRAFT OKAY. WE'RE HEARING YOU THROUGH YARRAGADEE. HOW DO YOU READ BREWSTER?

CAPCOM I READ YOU 5 BY JACK. OVER INDIAN OCEAN WE PASSED YOU A GO FOR THE PAYLOAD BAY DOOR CLOSING AND RECOMMENDED A MANUAL CLOSURE. DID YOU COPY THAT?

CAPCOM COLUMBIA, HOUSTON. HOW DO YOU READ? OVER.

SPACECRAFT 5 SQUARE BREWSTER. HOW ME?

CAPCOM I HAVE YOU 5 SQUARE AS WELL JACK. DID YOU COPY OU GO FOR PAYLOAD BAY DOOR CLOSING?

SPACECRAFT NEGATIVE, BUT WE'LL DO IT. THANK YOU. WE WERE WAITING FOR THAT.

CAPCOM OKAY JACK AND WE RECOMMEND THAT YOU CLOSE THEM MANUALLY RATHER THAN USING THE AUTO SEQUENCE.

SPACECRAFT UNDERSTAND MANUAL CLOSURE. THANK YOU.

CAPCOM COLUMBIA, HOUSTON. TWENTY SECONDS LOS. ORRORAL VALLEY IN 2 MINUTES.

SPACECRAFT OKAY. WE'LL SEE YOU AT ORRORAL. WE'RE GETTING READY TO CLOSE THE DOORS.

CAPCOM OKAY. WE CAN WATCH IT HAPPEN.

END OF TAPE

SPACECRAFT OKAY, WE'RE IN A NORMAL JETS, CAN WE TURN THE VERNIERS OFF NOW?

CAPCOM YES JACK, YOU CAN DO THAT NOW, IF YOU LIKE.

SPACECRAFT OKAY, WE'LL JUST TURN THE VERNIER DRIVER OFF.

CAPCOM OKAY.

SPACECRAFT OKAY, HERE WE GO WITH GLOBAL 1, YOU WANT TO WATCH THIS, HOUSTON.

CAPCOM SAY AGAIN, JACK.

SPACECRAFT I DON'T KNOW WHAT STATION WE'RE OVER RIGHT NOW, BUT WE'RE DOING GLOBAL 1 AND 318, IN CASE YOU WANTED TO WATCH.

CAPCOM OKAY, WE'RE OVER MILA.

SPACECRAFT OKAY WE GOT PRIME B ON AND THE HIGH LOAD EVAPORATOR ENABLED.

CAPCOM OKAY, JACK, WE'RE LOOKING AT THAT. AND WE'D LIKE TO BE ON DAP B.

SPACECRAFT DAP B. STILL ON THE RADIATORS BREWSTER.

CAPCOM COPY.

SPACECRAFT THIS IS COLUMBIA.

CAPCOM GO AHEAD.

SPACECRAFT STILL LOOKING AT DATA ON THE RADIATORS. YOU MAY SEE THEM. THE PORT RADIATOR, UNLATCHED BRIEFLY, THEN WENT BACK LATCHED, KIND OF OVERSHOT OFF POSITION WITH THE SWITCH.

CAPCOM NO PROBLEM. COLUMBIA, HOUSTON, WE'RE 45 SECONDS LOS, YOU'RE DPS, PCS AND RCS CONFIGURATIONS ALL LOOK GOOD. PRIMARY B IS CONTROLLING PRETTY WELL, NOW. WE'D LIKE TO STAY ON IT UNTIL AT LEAST MADRID, AND WE'LL GET YOU BACK ON A FOR THE ENTRY.

SPACECRAFT OKAY, THAT'S GOOD NEWS, THANK YOU, BREWSTER.

CAPCOM ROGER.

PAO THIS IS SHUTTLE CONTROL. BERMUDA HAS LOSS OF SIGNAL. NEXT ACQUISITION THROUGH MADRID IN 5 MINUTES. RADIATORS ARE BEING BYPASSED, AND CREW WILL BEGIN THE PROCESS OF CLOSING THE PAYLOAD BAY DOORS IN ABOUT 30 TO 40 MINUTES. WE'RE 3 HOURS, 49 MINUTES AWAY FROM DEORBIT IGNITION. WE'RE IN ORBIT 129,

DEORBIT WITH A LANDING AT NORTHRUP ON ORBIT 130. AT 7 DAYS, 19 HOURS, 24 MINUTES, MISSION ELAPSED TIME. THIS IS SHUTTLE CONTROL, HOUSTON.

CAPCOM COLUMBIA HOUSTON, THROUGH MADRID FOR 4 MINUTES.

SPACECRAFT OKAY, LOUD AND CLEAR THROUGH MADRID, BREWSTER.

CAPCOM GOT YOU JACK. COLUMBIA HOUSTON, PRIMARY B HAS BEEN CONTROLLING NICELY. WE CAN GO TO A NOW, WE'D LIKE PRIMARY B OFF, AND THEN PRIMARY A ON, OVER.

SPACECRAFT OKAY, PRIMARY B OFF, AND A IS COMING ON.

CAPCOM ROGER, THANK YOU. COLUMBIA, HOUSTON, IGNORE THE EVAP OUT TEMP, IT'LL COME BACK DOWN.

SPACECRAFT IT'S COMING BACK DOWN RIGHT NOW. DUMP 46.

CAPCOM ROGER. COLUMBIA, HOUSTON 30 SECONDS LOS, INDIAN OCEAN IS NEXT IN 12 MINUTES.

SPACECRAFT OKAY, WE'RE JUST STARTING OVER A MIGHTY BIG BEACH, HERE.

CAPCOM ROGER.

PAO THIS IS SHUTTLE CONTROL. COLUMBIA IS OUT OF RANGE NOW AT MADRID HEADING TOWARD THE INDIAN OCEAN STATION, ON ORBIT NUMBER 127. SHOULD HAVE ACQUISITION AT THE INDIAN OCEAN STATION IN ABOUT 10 MINUTES. AT 7 DAYS, 19 HOURS, 36 MINUTES, MISSION ELAPSED TIME; THIS IS SHUTTLE CONTROL, HOUSTON.

CAPCOM COLUMBIA, HOUSTON THROUGH INDIAN OCEAN FOR 7 MINUTES, OVER.

SPACECRAFT OKAY, BREWSTER, WILL YOU LOOK AT THE LINE ON THE BIG MAP, HOW CLOSE TO THE SEASHELLS DO WE GO ON THIS PASS?

CAPCOM YOU GO NORTHEAST ON A SOUTHEASTERLY HEADING, AND I'LL SEE IF I CAN FIND OUT HOW CLOSE YOU ARE. GORDO, WE THINK THAT YOUR CLOSEST POINT, WHICH IS COMING UP REAL SHORTLY HERE, YOU'LL BE, BETWEEN 2 AND 3 HUNDRED MILES AND IT SHOULD BE TO YOUR SOUTHWEST.

SPACECRAFT OKAY, THAT'S REAL FAR TO SEE, IT LOOKS LIKE WE GOT CLOUDS.

END OF TAPE

CAPCOM COLUMBIA, HOUSTON, 15 SECONDS LOS, ORRORAL IN ONE MINUTE.

SPACECRAFT OKAY.

CAPCOM COLUMBIA, HOUSTON THROUGH ORRORAL VALLEY FOR 4 AND A HALF MINUTES. GNC SPEC 1 PLEASE.

SPACECRAFT STANDBY. OKAY GOT IT.

CAPCOM WE SEE IT ON CRT 1, THANK YOU.

SPACECRAFT WE JUST GOT AN OBC STATUS MESSAGE, ARE YOU COMMANDING THE PAYLOAD OR SOMETHING?

CAPCOM THAT'S AFFIRMATIVE. GORDO, CRT 1 IS YOURS.

SPACECRAFT OKAY, THANK YOU.

CAPCOM COLUMBIA, HOUSTON, 30 SECONDS LOS, LOOKS LIKE YOU'RE AHEAD OF THE TIMELINE AND LOOKING GOOD. WE'LL SEE YOU OVER MILA IN 30 MINUTES.

SPACECRAFT OKAY, WE JUST DID THE PCS CONFIG. YOU CAN HAVE A LAST QUICK LOOK AT THAT.

CAPCOM COPY.

PAO THIS IS SHUTTLE CONTROL. COLUMBIA HAS MOVED AWAY FROM THE RANGE OF THE ORRORAL STATION. NEXT ACQUISITION THROUGH MERRITT ISLAND IN 29 MINUTES. AT 7 DAYS, 18 HOURS, 43 MINUTES; MISSION ELAPSED TIME; THIS IS SHUTTLE CONTROL HOUSTON.

PAO THIS IS SHUTTLE CONTROL AT 7 DAYS, 19 HOURS, 3 MINUTES; MISSION ELAPSED TIME. FLIGHT DYNAMICS OFFICER, CRAIG STERESINICH HAS GENERATED NEW ENTRY ELAPSED TIME FOR A ORBIT 129, DEORBIT AND LANDING AT NORTHRUP ON ORBIT 130. TIME FOR THE DEORBIT IGNITION IS NOW 7 DAYS, 23 HOUR, 13 MINUTES, 30 SECONDS. ENTRY INTERFACE AT 7 DAYS, 23 HOURS, 34 MINUTES, 42 SECONDS AT AN ALTITUDE OF 416,000 FEET AND A RANGE FROM NORTHRUP STRIP OF 4100 MILES. BLACK OUT WOULD BEGIN AT 7 DAYS, 23 HOURS, 37 MINUTES, 23 SECONDS AT AN ALTITUDE OF 334,000 FEET AT A RANGE OF 3500 MILES. BLACK OUT ENDS 7 DAYS, 23 HOURS, 52 MINUTES, 14 SECONDS AT AN ALTITUDE OF 173,000 FEET AND A RANGE OF 500 MILES. AND TOUCH DOWN, 8 DAYS, 0 HOURS, 5 MINUTES, 3 SECONDS. THAT IS THE LATEST INFORMATION THAT HAS BEEN GENERATED BY THE FLIGHT DYNAMICS OFFICER. COLUMBIA IS ABOUT 7 MINUTES AWAY FROM ACQUISITION THROUGH MERRIT ISLAND. THIS IS SHUTTLE CONTROL HOUSTON.

CAPCOM COLUMBIA, HOUSTON, THROUGH MILA FOR 11 MINUTES, OVER.

SPACECRAFT HELLO, READ YOU LOUD AND CLEAR MILA. BREWSTER, HOW ARE YOU?

CAPCOM READ YOU FIVE BY, JACK. COLUMBIA, HOUSTON, A REMINDER YOU'RE COMING UP ON THE RAD BYPASS STOW. AND YOU'LL NEED TO GET THE RJDS ON AND GO TO NORMAL JETS PRIOR TO THAT.

SPACECRAFT OKAY. OKAY, WE'RE IN NORMAL JETS, CAN WE TURN THE RADIATORS OFF NOW?

CAPCOM YES, JACK YOU CAN DO THAT NOW IF YOU'D LIKE.

SPACECRAFT OKAY, WE'LL JUST TURN THE RADIATORS OFF.

CAPCOM OKAY.

SPACECRAFT OKAY, HERE WE GO WITH OVAL 1, WATCH THIS HOUSTON.

CAPCOM SAY AGAIN, JACK.

SPACECRAFT I DON'T WHAT STATION WE'RE OVER RIGHT NOW, BUT WE'RE DOING GLOBAL 1 AND 3 18. IN CASE YOU WANTED TO WATCH.

CAPCOM OKAY, WE'RE OVER MILA.

SPACECRAFT OKAY, WE GOT PRI B ON AND ALONG WITH THAT PRI A ENABLED.

CAPCOM OKAY JACK, WE'RE LOOKING AT THAT AND WE'D LIKE TO BE ON DAP B.

SPACECRAFT DAP B.

END OF TAPE

CAPCOM WE'LL DO THAT. AND JACK I HAVE A COMMENT ON THE STATE OF YOUR JETS.

SPACECRAFT WHAT'S THAT.

CAPCOM OKAY AT TIG MINUS 5, THE UPDATE MESSAGE TELLS YOU TO GO TO A DUAL G2 CONFIGURATION AND CONFIGURE THE RJDS AND GO TO NORMAL JETS. WE'D LIKE YOU TO STAY, TO DO THAT, GO TO DUAL G2 AND CONFIGURE RJDS BUT STAY ON THE VERNIER JETS UNTIL TIG MINUS 4 HOURS WHEN THE MESSAGE HAS YOU DOING THE RAD BYPASS. AND JUST PRIOR TO THE RAD BYPASS AT TIG MINUS 4, GO TO THE NORMAL JETS, OVER.

SPACECRAFT OKAY, JUST PRIOR TO RAD BYPASS AT TIG MINUS 4 GO TO NORMAL JETS.

CAPCOM THAT'S GOOD READBACK JACK.

SPACECRAFT AND HERE'S SOME NUMBERS FOR YOU. ITS A COOL NIGHT IN THE PGU RIGHT NOW. IT'S 24.0, 23. NINER, 23.7, 23.6, 23.6, 23.5, AND THE LAST STATUS IS OFF, THE CENTER IS DOWN.

CAPCOM OKAY, COPY THAT AND DO YOU HAVE A TIME FOR THAT? RIGHT NOW, HUH?

SPACECRAFT THAT'S RIGHT, RIGHT NOW.

CAPCOM OKAY. COLUMBIA, HOUSTON, WE'RE 30 SECONDS LOS, YARRAGADEE IS NEXT IN 27 MINUTES. WE ARE RECORDING VOICE AGAIN AND WE SHOW THE TIG TIME IS MINUS 5 HOURS, 11 MINUTES, AND 10 SECONDS.

SPACECRAFT OKAY, SO DO WE, THANK YOU.

PAO THIS IS SHUTTLE CONTROL. COLUMBIA HAS MOVED OUT OF RANGE AT MADRID. NEXT ACQUISITION THROUGH YARRAGADEE IN AUSTRALIA IN 26 MINUTES. AT 7 DAYS, 18 HOURS, 2 MINUTES; MISSION ELAPSED TIME; THIS IS SHUTTLE CONTROL HOUSTON.

PAO THIS IS SHUTTLE CONTROL AT 7 DAYS, 18 HOURS, 28 MINUTES; MISSION ELAPSED TIME. YARRAGADEE IS ABOUT TO ACQUIRE COLUMBIA.

CAPCOM COLUMBIA, HOUSTON THROUGH YARRAGADEE FOR 7 MINUTES, OVER.

SPACECRAFT OKAY BREWSTER, HOW DO YOU READ?

CAPCOM READ YOU FIVE BY, GORDO.

SPACECRAFT OKAY, YARRAGADEE IS COMING IN BETTER TODAY. WE'RE JUST BUSY PUTTING THINGS AWAY.

CAPCOM OKAY, KIND OF COPIED THAT, I DON'T THINK YARRAGADEE IS ALL THAT HOT. WE'RE NOT READING YOU ALL THAT WELL.

SPACECRAFT WE'RE PACKING IT UP AGAIN, BREWSTER.

CAPCOM OKAY, I COPIED THAT JACK.

SPACECRAFT I FIGURED YOU'D GET THAT ONE.

CAPCOM COLUMBIA, HOUSTON WE HAVE 6 MINUTES LEFT IN THIS PASS. SOMETIME WHILE YOU'RE PASSING BY YOUR DEORBIT PREP BOOK, I'VE GOT A COUPLE OF NOTES, BUT THERE'S NO RUSH.

SPACECRAFT OKAY, I'M PASSING RIGHT BY IT. WHY DON'T YOU SHOOT 'EM UP.

CAPCOM OKAY, GORDO. ON PAGE 3-21 AT TIG MINUS 415, THERE IS AN ARS WATER LOOP CONFIG, BUBBLE FOUR.

SPACECRAFT OKAY, I'VE GOT THAT.

CAPCOM OKAY, YOU CAN DELETE THAT BUBBLE. AND INSTEAD OF DOING THAT, ALL WE WANT YOU TO DO THERE IS TRIM WATER LOOP 2, INTERCHANGER FLOW, TO 950 PLUS OR MINUS 25.

SPACECRAFT ALRIGHT.

CAPCOM AND THE NEXT COMMENT IS AT THE BOTTOM OF THAT PAGE, AT TIG MINUS 4, WHERE WE'RE GOING TO DO THE RAD BYPASS.

SPACECRAFT THAT'S CORRECT, OKAY.

CAPCOM OKAY, AND THE OBJECT THERE IS WE'D LIKE TO TRY AND LOOK AT CONTROLLER B, PRI B AGAIN. YESTERDAY, IF YOU RECALL, WHEN TO CONTROLLER PRI B, YOU GOT A FAULT MESSAGE, EVAP OUT TEMP., AND WE WENT BACK TO A. WE'D LIKE YOU TO PRI B AGAIN TODAY, AND WHEN YOU BYPASS A RAD, YOU MAY GET AN INITIAL EVAP OUT TEMP MESSAGE. AND WE'D LIKE YOU TO SIT ON PRI B FOR LITTLE WHILE. IF YOU GET ANOTHER MESSAGE FOLLOWING, THEN GO TO PRI A. BUT IF YOU DON'T GET ONE, LET IT SIT ON PRI B FOR ABOUT 5 MINUTES TO STABILIZE OUT. IF IT DOES THAN WE'LL GET YOU BACK ON PRI A PRIOR TO ENTRY, OVER.

SPACECRAFT OKAY, WE'LL GIVE PRI B ANOTHER SHOT.

CAPCOM OKAY, THAT'S ESSENTIALLY IT, GORDO.

END OF TAPE.

SPACECRAFT Steve.

CAPCOM Go ahead.

CAPCOM Columbia Houston, go ahead.

SPACECRAFT We noticed that the hydraulic accumulator press is reading off scale low. We presume that there's just some instrumentation that's not powered up, is that correct?

CAPCOM Roger the DFI is powered down, Jack.

SPACECRAFT All right thank you, we surmised the same but wanted to be sure and check with you on that.

CAPCOM That's fine. If you do have time on this pass, would like the torquing angles and time from the IMU alignmen and also I have some METs of future maneuvers, if you want th

SPACECRAFT Okay here is the torquing angles, are you ready copy?

CAPCOM Go ahead.

SPACECRAFT IMU 1 plus .05 plus .0 ninered, minus .28. IMU minus .12 minus .05 plus .1 ninered. IMU 3 plus, correction 3 minus .07 plus .12 minus .04. All copy, hear a torque at 1724.45.

CAPCOM Okay copy good, Jack.

SPACECRAFT Go ahead with your times.

CAPCOM Roger the first is at TIG minus 302 for the aut maneuver to top sun on page 3-27. Over.

SPACECRAFT Go ahead.

CAPCOM The time is 7 days 2 zero hours 11 minutes. Ov

SPACECRAFT Okay copy 7, 20, 11.

CAPCOM Roger next is on page 3-33.

SPACECRAFT IMU attitude, go ahead.

CAPCOM Roger IMU attitude top of the page 7 days 21 h 14 minutes. Over.

SPACECRAFT 7 slash 21 14 0 0.

CAPCOM Roger. At the bottom of the same page for top attitude 7 days 21 hours 38 minutes. Over.

SPACECRAFT Okay. Top sun 7 slash 21 38 0 0, all copy.

CAPCOM That's a good copy and that's all I have, Jack.

SPACECRAFT Alright thank you, we're putting on a little breakfast and tidying up around here and get on with it.

CAPCOM Roger.

SPACECRAFT Got any weather updates?

CAPCOM Roger standby. Jack for Northrup on rev, deort rev 129 landing 130, 25,000 scattered, visibility 7 plus, wir are 270 at 10, gusts to 20, altimeter 3003, so its looking gc

SPACECRAFT Okay thank you.

CAPCOM We'll get you an update on the upper winds fore a little later and we are not 30 seconds LOS. Next is Madrid 7 minutes.

SPACECRAFT Here the same....

PAO This is shuttle control. Columbia has lost sig with Bermuda. Next station Madrid in 6 minutes. The crew is preparing for breakfast. And we gave them a brief on the wea at Northrup for the landing this morning. At 7 days 17 hours minutes mission elapsed time. This is Shuttle Control Houstc

PAO This is Shuttle Control at 7 days 17 hours 55 minutes mission elapsed time. Columbia coming up on acquisit through Madrid.

CAPCOM Columbia Houston through Madrid for 6 minutes. Over.

SPACECRAFT Okay Bruster, you're loud and clear.

CAPCOM Your loud and clear as well. The fuel cell pur looked good and we won't have to do another one if we come dc today.

SPACECRAFT Allrighty. You still there Steve?

CAPCOM We're here Jack.

SPACECRAFT Hello there, Brewster, you'll appreciate this b a farm-boy,(garble) I got my gardener working here, he'll be you in a minute. Have the PGU folks standing by.

CAPCOM Okay we'll do that.

CAPCOM And Jack I have a comment on the state of your jets.

SPACECRAFT Let me hear it.

CAPCOM Okay at TIG minus 5 the update message tells yc go to a dual G2 configuration and figure the RJD's and go to normal jets, we'd like you to stay, to do that go to dual G2 configure RJD's but stay on the vernier jets until TIG minus hours when the message has you doing the RAD bypass. And jus prior to the RAD bypass at TIG minus 4 to go to the normal jets. Over.

SPACECRAFT Okay this part of the rat bypass TIG minus 4 gc the normal jets.

CAPCOM That's a good readback Jack.

SPACECRAFT And here's some numbers for you. Its a cool ni in the PGU right now. It's 24.0, 23.ninered., 23.7, 23.6, 23 23.5, and the last status is off.

END OF TAPE

PAO This is Shuttle Control at 7 days 17 hours 2 minutes mission elapsed time. Columbia is on orbit number 1: approaching acquisition through Orroral Valley.

CAPCOM Columbia Houston through Orroral Valley for 5 minutes over.

SPACECRAFT Okay we got you in Orroral, Steve, and we're putting the changes into deorbit prep, we got an IMU align attitude loaded in.

CAPCOM Okay fine. I would just like to confirm with that you do have the proper messages. Could I go over them please.

SPACECRAFT Go ahead Steve.

CAPCOM At Madrid, we sent up 83 echo, 86 alfa and 87 previously we had sent up 84 bravo. Four messages, over.

SPACECRAFT Okay we've got 83, 86, 87, was 84 the PGI one

CAPCOM That's affirm.

SPACECRAFT Okay 84 is deorbit prep backout changes, we g that. We've apparently got all the messages.

CAPCOM My mistake and your right, 86 alfa is the ent maneuvers.

SPACECRAFT And we're done the preliminary work on the de prep message. We put the, we did the work on AVE BAY 3 and interconnected the fuel cell purge, look at the fuel cells, you would please.

CAPCOM Okay we're looking at those and no water dump required this morning, Jack.

SPACECRAFT Roger. No water dump.

CAPCOM Columbia Houston we show on the ground that A BAY 3 smoke detector A shows an alarm output. Did that occu when you discharged the handheld into that bay or do you hav alarm now? Over.

SPACECRAFT No that occured when we discharged the extinguisher into the AVE BAY.

CAPCOM Copy. Thank you.

CAPCOM Jack, did you attempt to reset that smoke de with no joint. Over.

SPACECRAFT I did not try to attempt, reset it, I will do now. Over.

CAPCOM Roger.

SPACECRAFT Okay reset, well.

CAPCOM Thank you.

SPACECRAFT Sure.

CAPCOM Columbia Houston, one minute to go in this pa: I do have some cryo switches on R1 and A11, ifs its inconvie: will get them at the next pass.

SPACECRAFT Ahh, that's good.

CAPCOM Okay on panel R1, 02 and H2 tank 3 heaters al to auto, Gordo.

SPACECRAFT Got that.

CAPCOM And back on panel A11, same thing for tank 4, 02 H2 tank 4 heaters alpha to auto. Over.

SPACECRAFT Okay.

CAPCOM Thank you. That's for cryo management, we're recording voice this morning, we're 20 seconds LOS and we'll you next at Buckhorn, correction at Bermuda in about 32 minu

SPACECRAFT Okay we'll see you there, Steve.

PAO This is Shuttle Control. Orroral has loss of signal. Next station is Bermuda in 34 minutes. At 7 days 1 hours 9 minutes, mission elapsed time. This is Shuttle Cont Houston.

PAO This is Shuttle Control at 7 days 17 hours 43 minutes mission elapsed time. The Bermuda station will acqu Columbia in about 30 seconds.

CAPCOM Columbia Houston through Bermuda. Over.

SPACECRAFT Okay we're getting you through Bermuda. We g the activities down to 5 hours.

CAPCOM Copy down to 5 hours, very good.

SPACECRAFT Steve.

CAPCOM Go ahead.

CAPCOM Columbia Houston go ahead.

SPACECRAFT I renoticed that the hydraulic accumulator pressure is reading....

END OF TAPE

PAO And we expect a rather light activity this mor for the crew, giving them the opportunity to leisurely prepa for the deorbit activities. Again the change of shift brief with flight director Tommy Holloway regretably, but necessar had to be postponed until 3:00 a.m. central time in order to the flight control teams the opportunity to assure that all systems issues have been handed over and mutually understood both teams. Mission elapsed time now 7 days, 16 hours, 30 minutes. This is shuttle mission control.

PAO This is shuttle mission control, just a remind that acquisition of signal will occur in about 32 minutes th the UHF station at Orroral. Correct that through the S-band station at Orroral Valley. Next voice contact in just over minutes, at 7 days, 16 hours, 32 minutes. This is shuttle mission control.

PAO This is shuttle mission control at 7 days, 16 hours, 42 minutes. With apologies it becomes necessary to further slip the change of shift briefing with flight direct Tommy Holloway, another half an hour until 3:30 a.m. central time. The purpose of this to give him the opportunity to li and participate in the acquisition of signal period over Orr Valley, which begins 20 minutes from now. And as a pass of 5 minutes in duration give him an opportunity to look at dat from the vehicle and exchange some remarks with the crew. A participate further in the preparations for deorbit and entr today. Again, regretably but unavoidably we once again slip another 30 minutes on the change of shift briefing, with the flight director of the Ascent team. That briefing now at 3: a.m. central standard time. Acquisition of signal in 20 min mission elapsed time, 7 days, 16 hours, 43 minutes; this is shuttle mission control.

PAO This is shuttle mission control at 7 days, 16 hours, 53 minutes. The oncoming flight director Harold Drau has received a weather briefing from the weather systems off indicating that weather at Northrup Strip looks good for tod A high pressure is developing off the coast of California, southwest in the area of Baha, and that high pressure is dri away wind troughs, which had plagued Northrup yesterday. An weather officer described it as a very encouraging trend at Northrup. Kennedy Space Center is being influenced by a hig the Atlantic coast off shore, which generating a strong grad producing fairly strong winds. Forecast calls for ceiling o 7,000 feet broken clouds. Winds be less favorable, particul crosswinds would be less favorable, than yesterday. Nonethe weather conditions at both Kennedy and Northrup, at this juncture, appear to be acceptable for landing at either site today. And forecast for tomorrow looks even better. And in fact, Kennedy, Northrup and Edwards Force Base, would appear have improved, and favorabl weather for our landings at thos

locations tomorrow. Acquisiton of signal in 4 and a half min through Orroral Valley. We remind you again the change of sh briefing with off going flight director Tommy Holloway will b conducted at 3:30 a.m. central time. At 7 days, 16 hours, 55 minutes; this is shuttle mission control.

PAO This is shuttle control at 7 days, 17 hours, 2 minutes; mission elapsed time. Columbia is on orbit number 1 approaching acquisition through Orroral Valley.

End of tape.

CAPCOM (Music) Good morning Columbia. Houston throug Madrid for 4-1/2 minutes. Over.

SPACECRAFT (Music) You people better stand up. Okay. Yc can sit down now.

CAPCOM Thank you. If Mr. Kranz were here, he would ha loved that.

SPACECRAFT Good morning. It's a good morning up here. Hc it down there? (garble) we're right over the Straits of Gibralter. What a sight.

CAPCOM Oh great. We've got 3 minutes to go and it's good morning here. We're trying to set you up for 1:29 to Northrup Jack.

SPACECRAFT Steve, good morning to you. Jack didn't answe because he wants to get a picture of this.

CAPCOM Okay Gordo. We've got some teleprinter messag coming up that will outline the changes you need to put in y deorbit prep, the mission summary with the game plan and I h CRT timer update for a countdown to TIG at Northrup on 129. Over.

SPACECRAFT Okay. (garble)

CAPCOM All right. Item 17 plus 23 plus 13 plus 00.

SPACECRAFT (garble)

CAPCOM Roger Gordo. Item 17 plus 23 plus 13 plus 00. Over.

SPACECRAFT Okay. We got that and we also have already re the teleprinters except we couldn't find one of the messages there. I think it was message number 83.

CAPCOM Okay. I'm told we just retransmitted 83 and t check your clock. We're showing about 6 hours, 45 minutes, 50 seconds to TIG.

SPACECRAFT Okay. Well, I didn't get it in here so I just killed the job. (garbled).

CAPCOM Okay.

SPACECRAFT The wake up time gives a lot of viewing of pl that we haven't seen before.

CAPCOM Good.

CAPCOM And Columbia Houston. We're 10 seconds to LOS now. All the teleprinter messages were transmitted. We'll s you next at Orroral in 35 minutes.

SPACECRAFT Okay.

PAO This is Mission Control Houston at 7 days, 16 hours, 28 minutes. Columbia in orbit 125. Wake up call, the CAPCOM Steve Nagil, uplinked "This is My Country" to the crew the crew responded with downlink medley of the "Airforce Song and the "Marine Corp Hymn". And Jack Lousma correctly report their position over the Straits of Gibralter. The vehicle no the Mediterranean Sea, over the Mediterranean Sea right at th southern tip of Italy. Activities onboard are preparation fc the day and the morning meal. Post sleep activities involve configuring the communcations and electronic management, ener management activities onboard. Configuring cabin lighting ar removing and replacing the window shades and stowing equipmer We expect a rather light activity this morning for the crew giving them the opportunity to ....

END OF TAPE

PAO This is Shuttle Mission Control, 7 days 15 hou minutes, Columbia on orbit 124. Flight director Harold Drau and his team of flight controllers are presently debriefing in the mission control center, preparing to relieve flight director Tommy Holloway and his team, the Draughon team will course take over the control of the vehicle and prepare itse and astronauts Jack Lousma and Gordon Fullerton for deorbit landing activities this morning. The Tommy Holloway change shift briefing will occur on time at 2:30 a.m. central time the NASA news center building 2 room 135. This is Mission Control Houston.

PAO This is Shuttle Mission Control at 7 days 16 h 14 minutes. The crew is awake or should be awake, in fact w in a loss of signal period, we'll acquire in about 7 and a h minutes through Madrid. And that will be our first voice co and may in fact be the wake up contact if the crew hasn't se alarms onboard Columbia to assure that they wake up at the expiration of the sleep period. The briefing with, the chan shift briefing with flight director Tommy Holloway should be on schedule at 2:30 a.m. central time in the building 2 news center. Columbia is on its 125th orbit of the Earth and we standing by to get the first voice contact of the morning wi the crew in about 6 minutes through Madrid. Once again the Holloway briefing, change of shift briefing in about 15 minu at 2:30 a.m. central time. This is Shuttle Mission Control days 16 hours 16 minutes.

PAO This is Shuttle Mission Control at 7 days 16 h 19 minutes. Flight director Tommy Holloway has advised that will be necessary to slip his change of shift briefing until a.m. central time due to the burdent nature of the hand over the necessity to make sure all systems issues are handed completely from one team to the other. It will be necessary prolong his debriefing period that long and accordingly the change of shift briefing will be delayed 30 minutes until 3: a.m. Acquisition of signal in 2 and a half minutes through Madrid for first voice contact of the day with the vehicle. days 16 hours 19 minutes. This is Shuttle Mission Control.

PAO This is Mission Control at 6 days, at 7 days 1 hours 22 minutes, expect voice contact through Madrid, momentarily, our first contact of the day with the crew.

Wake up music...

CAPCOM Good morning Columbia. Houston through Madrid 4 and a half minutes. Over.

SPACECRAFT (music from crew) Airforce and Marine Hymns

END OF TAPE

PAO to room 135. Mission elapsed time 7 days, 10 hours, 24 minutes, this is shuttle mission control.

PAO This is shuttle control, Houston, at 7 days, 1: hours, 21 minutes. The vehicle is just now passing over Guar it's 122nd orbit of the Earth. Just had loss of signal and downlink data at Guam indicates the systems on board are performing as expected. Crew continues to have a restful nig with 3 and a half hours remaining in their sleep period. Th: mission control Houston.

PAO This is mission control, Houston. Mission ela; time, 7 days, 13 hours, 2 minutes; 3 hours remaining in the astronauts sleep period. The vehicle is on orbit number 123. Just passed over the S-band station at Santiago, Chile. Got downlink data down and systems on board the vehicle are in g: shape. The astronauts sleep period completely undisturbed. course word has been distributed to the area of flood warnin high tides, with possible affect on the Seabrook and Kemah areas. The flight control team has been advised and assuran have been made the roads will be open and that on coming ent: team members who live in those areas would have accessibilit the site and won't have any problems getting on site. And i appears that none of the entry team members are residents of areas which would be affected by the flooding, or possible flooding, so that concern has been alleviated here in the co: center. Have acquisition of signal again in about 5 minutes through Ascension and Dakar, this is shuttle mission control

PAO This is mission control Houston at 7 days, 14 hours, 33 minutes. Columbia on its 124th orbit of the Earth Just had loss of signal through Santiago, Chile and the down data continues to reveal that the vehicle is performing nominally. All onboard systems are working well. The astro: are continuing through their sleep period undisturbed, wake- time is in about an hour and a half. Some of the entry team members have begun to arrive in the mission control center. Working with local law enforcement officials, the control ce: has determined that the flood warnings in the Johnson Space Center area will not constitute any problem in allowing the coming entry team members to obtain street access to the spa center. Flight director, Tommy Holloway's change of shift briefing we believe will be on schedule at 2:30 a.m. central time. From the mission control center at 7 days, 14 hours, 34 minutes.

End of tape.

CAPCOM Columbia, we're one minute to LOS, you guys be sure and get a good sleep. And for your information, you're running at 10 kilowats now and the vehicle looks real good to us on the ground.

SPACECRAFT Okay, good night to all of you.

CAPCOM Good night guys.

PAO This is mission control Houston, at 7 days, 7 hours, 57 minutes. In about 3 minutes at 6 p.m. central time, or NASA select we're going to feed a video tape of some stock footage acquired by NASA of the shuttle training aircraft practicing approaches at the shuttle landing strip at Kennedy Space Center. Once again at 6 p.m. central time. At 6 p.m. central time, we will put on NASA select a video tape replay of some earlier shuttle training aircraft practice approaches shot at the shuttle landing strip at the Kennedy Space Center. This is mission control Houston.

PAO This is shuttle mission control. In a minute and a half we will be putting our NASA select of video tape replay of shuttle training aircraft, shooting approaches at Kennedy Space Center. This will be a replay of film acquired some time back, and from NASA stock footage. And that video tape is about 3 minutes in duration.

PAO This is mission control, Houston at 7 days, 8 hours, 20 minutes. Over NASA select we are presently replaying the video tape from our stock footage, shot earlier of shuttle training aircraft activities at Kennedy Space Center, Florida. We just had acquisition of signal at Santiago, Chile and got some downlink S-band data from the vehicle indicating that systems are all nominal on board. No sign of crew activity, which we presume means that the crew has buttoned it up, and is trying to get some rest in the anticipation of entry day activities tomorrow morning. We're about a half an hour into the sleep period. And it'll be 10 minutes before we acquire signal again through Ascension Island. Columbia is on its 120th, one hundred and twentieth orbit of the Earth, at 7 days, 8 hours, 22 minutes, this is shuttle mission control.

PAO This is shuttle mission control, at 7 days, 9 hours, 41 minutes. Crew rest period continues undisturbed. Columbia is on its 120th orbit of the Earth. And downlink data affirms that all onboard systems are performing nominally. As a reminder the change of shift briefing with flight director, Neil Hutchinson will occur on time at 8:30 p.m. central time, in the building 2 news center, room 135 of the Johnson Space Center. This is shuttle mission control.

PAO This is mission control Houston, at 7 days, 10 STS

hours, 23 minutes. All systems onboard the shuttle continue to perform nominally. And crew rest period proceeds uninterrupted. The hand over has occurred in the mission contro center from the silver team, and flight director Neil Hutchinson to flight director Tommy Holloway and his ascent team of flight controllers, who now have responsibility for the flight. Mr. Hutchinson has left the mission control center and is on route t the NASA news center presently. And the change of shift briefin will occur on time at 8:30 p.m. central standard time in buildin 2, room 135. Mission elapsed time, 7 days, 10 hours, 24 minutes this is shuttle mission control.

End of tape.

SPACECRAFT ...They're quiet. At least that's the way we see it from here. Perhaps you see it differently but it's very encouraging to us.

CAPCOM Roger Jack. Copy.

CAPCOM And Columbia Houston, 1 minute left in this pass sc we decided that we like the attitude you're in now and plan on keeping that through the night. Over.

SPACECRAFT (garble) come over (garble). That'll be fine. I just had a little exercise on Bill Thornton's treadmill and it works good.

CAPCOM Roger. We copy and sorry about the attitude.

SPACECRAFT Well, we're hitting the sack anyway. Maybe you ca do something different tomorrow but if not, so be it.

CAPCOM Roger and we're 30 seconds to LOS. We'll ditto everything Sally said last night about working with you and look forward to seeing you on the ground tomorrow.

SPACECRAFT Okay. I'm not sure you should have said that, we might be wrong again, but I noticed Sally's not there today. Is that right?

CAPCOM Yeah. She's standing by.

CAPCOM And Columbia, going LOS and we'll be with you for a few hours. If we can find the Ivory Team, we'll have them on to watch you for a while during the night.

SPACECRAFT Okay. If you can't, why, we'll watch ourselves I guess.

CAPCOM Roger that.

PAO This is Shuttle Mission Control at 7 days, 7 hours, 13 minutes. LOS through Indian Ocean Station and that essentially puts the crew to bed for the night and 16 minutes until their sleep period. Crew clearly not in any big hurry to deorbit and come back. Asked for an attitude which would give them some Earth views which the flight control team was unable to provide due to requirements for the passive thermal control attitude over night. Had the word that consumables and power were good for a wave off tomorrow and in fact, even the next day if required and Mission Commander Jack Lousma reported they got some exercise on the treadmill being flight tested, designed by Astronaut Bill Thornton and reported that it worked well at 7 days, 7 hours, and 14 minutes, this is Mission Control Houston.

SPACECRAFT Houston Columbia.

CAPCOM Go ahead Columbia.

CAPCOM Columbia Houston. You're loud and clear. Go ahead.

SPACECRAFT Okay. No problems. We just hadn't got it quite turned in yet but I was just wondering George, if you'd heard if our families are hanging over night there at Northrup waiting fo our next try tomorrow.

CAPCOM Stand by Gordo. We'll find that out for you real quick. And we're passing the message through the glass in the viewing room now for anything.

SPACECRAFT Okay. It's no big deal. If there's a problem they'll (garble)

CAPCOM And Columbia Houston. Families are staying at Northrup and they're fine and waiting for you.

SPACECRAFT Okay. (garble). Molly and Andy, tell them I'm sorry we're late. (garble) and we'll get there as soon as we can.

CAPCOM Roger Gordo. We'll relay that.

CAPCOM And Columia, since you called, one more message. Your state vector is good through Northrup tomorrow. Over.

SPACECRAFT Okay. Sounds good.

SPACECRAFT (garble) thank goodness at the pass across Japan a few minutes back. Really pretty.

CAPCOM Roger.

SPACECRAFT Could you tell Terry Hart that this AOS program really pays off when we fly past the standard flight plan (garble) really becomes a nice gadget.

CAPCOM Yeah. That's a good point Gordo. We'll relay tha to him.

END OF TAPE

CAPCOM Roger, Jack, standby, we'll get you the latest reading and forecast.

SPACECRAFT Okay, thank you.

CAPCOM And Columbia, Jack, the weather at KSC right now is good. The forecast for tomorrow is a couple of scattered decks, with the winds from about 130 at 13, with possible gusts 15 to 18. And we're looking at some weather systems moving into that area and if a high pressure develops during the night like some people think it may, then the winds would be calm, over.

SPACECRAFT Okay.

CAPCOM Roger, Columbia we're 30 seconds to LOS, IOS will be our last pass of the night at 7 + 06. And for your information, we've got an STA located now both at Northrup and at the Cape. So we're ready for you either place, over.

SPACECRAFT Alright.

CAPCOM Columbia Houston through IOS. Columbia Houston, through Indian Ocean for 7 minutes, over. Columbia Houston, through Indian Ocean for 6 more minutes, over.

SPACECRAFT Okay, we certainly got you loud and clear.

CAPCOM Roger, and you're the same.

SPACECRAFT Houston, you figured it out, (garbled)

CAPCOM Roger, Gordo, no comment yet, we see the RCS configuration looks good and the fuel cell purge looks good, over.

SPACECRAFT Okay, thank you. You like the dap of rotation on attitude and all that George?

CAPCOM Roger, Jack it looks good to us.

SPACECRAFT Okay.

CAPCOM Columbia Houston, some more information. It looks like we have enough consumables, if we need them, for a wave off tomorrow, and even a wave off on the day after that if we need it. Currently the vehicle is running at 11 kilowatts and everything looks good, over.

SPACECRAFT Okay, George, that sounds real good. Have you guys cranked up anything on the OSS, or you want us to, to take advantage of the time?

CAPCOM Roger, Jack, negative on the OSS, we're going to leave them off to save our cryos in case we need them. Give you guys a chance to enjoy the ride for a while.

SPACECRAFT Okay, I'll give you something to think about. Seems like we don't have very good attitude for looking at the Earth and if it's all the same to everybody, and you can think o an attitude that would optimize that as well as accomplish your objectives. We'd appreciate some better Earth looking attitudes

CAPCOM Roger, Jack, we copy. And we'll take that into consideration here, over.

SPACECRAFT Okay, but not to compromise what you need to get done.

CAPCOM Understand.

SPACECRAFT Right now, we're kind of in a camping mode, we had everything really ship-shape and everything was torn down, put away and most of the stuff is put back where we got it. And except for some of the stuff, it seems like we are bringing back more than we came with But, right now we're kind of in a campin mode, we got a few things out and we don't expect to get much more stuff out unless you plan to wave-off for a day or two. So we'll be watching with interest, but expecting to come home tomorrow. Just thought you might like to know the operation we're in.

CAPCOM Roger, Jack, we copy and we're expecting to bring you home tomorrow too.

SPACECRAFT Well, we're not in a rush you know. It all coutns on twenty, all pays the same.

CAPCOM Roger, we copy and we're planning a pretty leisurely morning again tomorrow with no SCS checkout plan.

SPACECRAFT Okay, Yeah, I was really encouraged by the SCS checkout we had yesterday, I guess it was. Gee wiz, everything was right on the money.

CAPCOM Roger, and we were too Jack.

SPACECRAFT Yeah, this old bird really is a clean machine. Seems like it just hums right along and it's just amazing the maturity this things gotten to at third flight

End of tape.

CAPCOM ...over Botswana. We'd like to get one more PGU reading if you could for us and Botswana's next at 6 plus 57.

SPACECRAFT Okay (garble) took the readings already but I can't find the card. I'll try to round it up by Botswana.

CAPCOM Okay. It's no problem.

PAO Shuttle Mission Control at 7 days, 6 hours, 40 minutes. We've had loss of signal. Acquire again in 16 minutes through Botswana. The crew sleep period has been adjusted. They're going to be awake for another 50 minutes before we put them to sleep for the night. Gene Kranz, Deputy Director of Flight Operations is now leaving the Mission Control Center and is on his way to Building 2 and the Change of Shift Briefing there should begin just momentarily. At 7 days, 6 hours, 41 minutes, this is Shuttle Mission Control.

CAPCOM Columbia Houston through Botswana for 6-1/2 minutes.

SPACECRAFT (garble) I got those PGU numbers for you.

CAPCOM Roger Gordo. Go ahead. We're ready to copy.

SPACECRAFT Okay. This is a reading I just took at 7 days, 0645, 26.3, 26.5, 26.2, 26.3, 26.7, 27.4 and the temp warning light was off. (garble) is on and no (garble) power light. I took some back a couple of hours ago at 0409 and at that time th numbers were 26.2, 26.0, 25.1, 25.2, 26.5 and 28.1. Over.

CAPCOM Roger Gordo. We copy those. Thanks a lot. One note on cleanup for DPS, we'd like you to do a GPC CRT 1-2 execute and that's to get a machine assigned to CRT 2. Over.

SPACECRAFT Probably a good idea. Okay.

CAPCOM And Columbia Houston. I have one water loop configuration for you for sleep tonight when you're ready.

SPACECRAFT All right. Go ahead.

CAPCOM Okay Gordo. I'd like you to bring up spec 88 and take water loop 2 bypass to manual and decrease to get the max interchange of flow. Over.

SPACECRAFT Okay. We'll do it.

CAPCOM Roger. Thank you.

CAPCOM Columbia Houston. I'd like to give you a few

words on what we're thinking about the landing for tomorrow. Over.

SPACECRAFT Okay. We're all ears.

CAPCOM Roger Gordo. We're still looking for a wakeup around 1600 hours MET during the night and in the morning we're going to take a good look at the Northrup weather. If Northrup is good, we plan a TIG at around 7 days, 23 hours for a landing at 9:00 a.m. Northrup time. If the Northrup forecast is deteriorating and there's a 50-50 chance now. It's up in the air, then the weather at KSC looks good and we would wave off there and plan a TIG into KSC on the next REV. That would be a TIG at about 8 days, 55 minutes or so and that would land about 12:40 Cape time and we would still have a 1 REV later option about 8 days and 2-1/2 hours, landing at the Cape about 2:00 o'clock in the afternoon, local time. We also have Edwards opportunities on all of those orbits if we should need them, in case the weather there doesn't look good, but the weather does look like it's going to be pretty good at KSC. Over.

SPACECRAFT Okay. Understand.

CAPCOM Roger.

SPACECRAFT George, we haven't been tracking the weather much at KSC. What's the general conditions there?

CAPCOM Roger Jack. Stand by...

END OF TAPE

PAO At 7 days, 6 hours, 16 minutes, a minute and a hal away from acquisition of signal on orbit 118, this is shuttle mission control.

CAPCOM Columbia Houston, through the states for a minute and a half.

SPACECRAFT Okay, I didn't expect to get you back. But I gues (garble) We got (garble)

CAPCOM Roger, we copy that and that aft bay 2 off was after the GPC 2 is powered off, over.

SPACECRAFT Okay, we figured that. I was wondering what's our go to sleep and wake up time again?

CAPCOM Roger, Gordo. Gordo, we've got you going to sleep about MET of 7:30 tonight, and wake up about 16 hours, over.

SPACECRAFT Okay, 7:30 to 1600, okay.

CAPCOM And, Columbia, the vernier jets look good to us now, they're warm. So you have a go to re-enable the RM on F5L.

SPACECRAFT All right, we'll do that.

CAPCOM And Columbia, I have a couple of switches on R4 if you're ready.

SPACECRAFT Okay.

CAPCOM Roger, on R4 the hydraulic brake heater, alpha, bravo, and charlie to off, over.

SPACECRAFT Okay, they're off.

CAPCOM And while you're there, on R2, the MPS pneumatic helium cross over to GPC, over.

SPACECRAFT to GPC

CAPCOM And that's on the left engine.

SPACECRAFT Yeah, we got that.

CAPCOM Okay, and we're going LOS, and Santiago is next at 6 + 38.

SPACECRAFT Okay, we'll see you at 6 + 38, George.

PAO This is shuttle mission control, at 7 days, 6

hours, 27 minutes. Acquisition of signal in about 10 and a half minutes through the Indian Ocean station at orbit number 118. As a reminder the change of shift briefing with Gene Kranz, deputy director of flight operations who will be conducting that briefing in place of Harld Drawn, has been changed from 4:30 p.m central time to 4:45 p.m. central time. This is mission control Houston.

PAO This is shuttle mission control, less than a minute away from acquisition of signal at Santiago. During that loss of signal period, flight director Neil Hutchinson, queried the payloads officer about the impact of the mission and some of the items on board such as the plant growth unit, which of course will benefit from the extra day in space. No impact on the monodisperse latex reactant experiment. And got assurances that there are enough cryogens on board to keep the electrophoresis experiment frozen through this extra day of duration. We'll have acquisition of signal and voice contact in just a few moments. The Gene Kranz change of shift briefing again in just about 5 minutes, at 4:45 p.m. central time. At 7 days, 6 hours, 38 minutes, this is shuttle control.

CAPCOM Through Santiago for 2 minutes.

SPACECRAFT Okay, got you loud and clear.

CAPCOM Roger, you're loud and clear also. Can we get the torqueing times for the last IMU alignment, over.

SPACECRAFT Okay, just a minute.

CAPCOM And Columbia, while you're doing that, can we get GNC check 1 up for some variable parameters?

SPACECRAFT Didn't hear your last transmission. But we torque the IMUs at 0608, over.

CAPCOM Copy, 0608. And we'd like a GNC spec 1 for some variable parameters. And when you're through with that, you're go for the item 48 spec, clear up the cab.

SPACECRAFT Oh, okay.

CAPCOM And Columbia, after this pass, we'd like you to terminate the interconnect. Go back on normal feed, and a reminder to perform the item 5, prior to the item 7, for the guaging protection, over.

SPACECRAFT Okay, you want to terminate the i'connect, anytime now?

CAPCOM That's affirmative.

SPACECRAFT Okay.

CAPCOM And Columbia, going LOS, also over Botswana, we'd like to get to l

End of tape.

PAO makes some thunderous noise while they are firing to control the vehicle's attitude which interrupts the sleep period and, of course, use more fuel than do the vernier jets. Also instructions for changing out some CO2 absorbers to take carbon dioxide out of the cabin air. To recap the upcoming schedule of briefings at and these are central standard times at 4:30 p.m. the what would have been the Harold Draughon change of shift briefing will be conducted by Eugene Kranz, Deputy Director of the Flight Operations Division at Johnson Space Center, at 8:30 p.m. Neil Hutchinson who is currently Flight Director here of the Orbit team presently on console will conduct his change of shift briefing, again that time 8:30 p.m. central time. Tommy Holloway who will relieve the Hutchinson team will conduct his change of shift briefing either at 2 or 2:30 a.m. and we'll pin that time down and report it to you as soon as Mr. Holloway arrives here in the Mission Control Center. Once again, those times, central times, 4:30 p.m. Monday Gene Kranz, 8:30 p.m. Monday Neil Hutchinson, 2 or 2:30 a.m. Tuesday Tommy Holloway. Those change of shift briefings will be conducted in the NASA News Center Building 2 Room 135. Acquisition of signal in 40 minutes through Hawaii. Mission elapsed time presently 7 days 5 hours 31 minutes. This is Shuttle Mission Control.

CAPCOM Columbia Houston through Hawaii for one more minute.

SPACECRAFT Okay, we got you loud and clear.

CAPCOM Roger that Gordo. One note, from the EECOM's we'd like to get all the cryo heaters on tanks 3 and 4 off. That's both H2 and O2 heaters, all of them to off, over.

SPACECRAFT Okay we'll get that. We got your IMU alignment. We did a fuel cell purge, like you to take a look at that. We're in vernier jets. I changed the DAS rotation of point 404 bite point 0 0 because it looks consistent. Our deadband is 1 and if you don't like it you can tell us.

CAPCOM Roger Jack, we copy.

SPACECRAFT And you had one switch on the EPS that we never did get done about an hour ago and I guess we forgot it. If you think of it why let us know.

CAPCOM Roger Jack, and you have a go now to go to 1 GNC GPC, over.

SPACECRAFT Okay we'll go to 1 GPC.

CAPCOM And Roger, and after you're on the 1 GNC GPC configuration you're go to power off aft bay 2 fan alpha, over.

SPACECRAFT Okay, that's aft bay fan alpha 2 aft bay 2, you want us to put another one on or just leave it off?

CAPCOM Roger, just leave it off, over.

SPACECRAFT Okay. Any particular reason for doing that or are we getting short on juice?

CAPCOM Negative Jack, we're just being conservative, over.

SPACECRAFT Okay.

PAO This is Mission Control Houston at 7 days 6 hours 14 minutes. We've had loss of signal through Hawaii. Acquire again in. Mission Control. We've had loss of signal through Hawaii. Acquire again in about 3 minutes through Buckhorn. On rev 118 about 25 minutes until we enter the sleep period. And we've had a change of time for the Gene Kranz briefing which was scheduled for 4:30. We've had to slip that 15 minutes. The Kranz briefing will occur at 4:45 p.m. central time in Building 1 News Room 135. Once again, the Gene Kranz briefing 4:45 p.m. central time. Gene Kranz Deputy Director of Flight Operations will be conducting that change of shift briefing vice Harold Draughon. At

END OF TAPE

PAO NASA News Center Building 2 Room 135. Tommy Holloway and the Ascent team will be on console until hand over beginning at 7:30 a.m. Tuesday. Amend that, Tommy Holloway and the Ascent team will be on console until 1 o'clock a.m. Tuesday central time. The Holloway briefing will be conducted at approximately 2 o'clock perhaps 2:30 a.m. central time Tuesday morning. Mission elapsed time 7 days 5 hours 20 minutes. This is Shuttle Mission Control.

CAPCOM Columbia Houston through Botswana, how do you read? Columbia Houston through Botswana for 3 and 1/2 minutes, how do you read?

SPACECRAFT I read you loud and clear through Botswana, George go ahead.

CAPCOM Roger, Jack, you're loud and clear also. First of all a reminder, we'd like to get a fuel cell auto purge sometime before sleep tonight and we're looking at the conserving the cry(so we'd like to get the master DFI powered off and that's on C3, over.

SPACECRAFT Okay, master DFI is going off and had a heater misconfiguration on the APU tank fuel line water system awhile ago and we're reconsidering, you can think about it like it okay. I looked at spec 88 and looks like all the temperatures o1 the APUs are in good shape. At least there's no down arrows.

CAPCOM Roger Jack, we copy. We've got quite a few words to get up this pass so start in with the vernier configuration.

SPACECRAFT Go ahead.

CAPCOM Roger, we see on jet L5L it's still a little cold and to avoid getting a fail off leak we're going to deselect it's RM before we go back on verniers. It's on spec 23 page 1, like in item 38 inhibit the RM on F5L. Then you can perform bubble 3 on 4 8 to get back on the verniers, over.

SPACECRAFT Okay, I did the item 38. We got cap 5R in the same condition. He's looking at a late 2. Should I leave him alone?

CAPCOM Roger, standby on that Jack, and you are go to get back on verniers and you will get a fail leak on that F5L and you can disregard it.

SPACECRAFT Okay. F5R, did you say F5R we can disregard?

CAPCOM Negative Jack. You'll have to reselect both jets then do an item 47 then you can inhibit F5L with an item 38 and then get back on the verniers, over.

SPACECRAFT Okay, I've got both of them reselected, I've got item 38 inhibit and I'll go onto verniers, what else?

CAPCOM Roger, that'll take care of the verniers. The nex is some RMS reconfiguration. First one is to check a circuit breaker on MA73 Charley, row F, that's AC1 RMS primary phase A i closed, over.

SPACECRAFT Okay, I checked that one. That circuit breaker is closed.

CAPCOM Roger, the next for the RMS, we need two item 5's on spec 94, then we can cancel safing, give you a barber pole talk back, then on panel A8 select port RMS heaters auto.

SPACECRAFT Okay, did the two item 5's, then do what?

CAPCOM Roger, cancel safing, that'll give you a barber pole talk back and then on panel A8 port RMS heater to auto.

SPACECRAFT Okay, I got the port RMS heater to auto.

CAPCOM Roger, and we're 25 seconds to LOS. Hawaii's next at 6 plus 11. While we're LOS you can get a CO2 absorber replacement for us. We'd like number 9 into alpha, number 6 int bravo, over.

SPACECRAFT Okay, that'll be 9 to alpha and 6 to bravo. Thank you George.

CAPCOM Roger that and we'll see you at Hawaii.

PAO This is Mission Control Houston at 7 days 5 hours 29 minutes. During that pass the crew was instructed to configure the vehicle to get on the vernier reaction control system jets. They're getting them off the big primary jets which, of course, make some thunderous noise while they're firin

END OF TAPE

PAO The weather at Kennedy is reported to be excellent and that 130, orbit number 130 return would be at a time of day, early in the day when there's a lower probability of severe wind at White Sands. We'll have acquisiton of signal again in 32 minutes through Botswana at orbit number 117 and mission elapsed time of 7 days 4 hours 52 minutes, this is Mission Control Houston.

PAO The Shuttle Mission Control, let me just correct something I'd said earlier about wake up times translates actually to 2 a.m. central time.

PAO This is Mission Control Houston just to repeat the orbit of opportunity, the orbit entry opportunity as sited by th Capcom earlier. The first would be on ramp number 129, the landing time at Northrup on that rev in central standard time would be 10:07 a.m. It is possible to deorbit and land at Kennedy on rev 129. The landing time at Kennedy in central standard time would be 10:13 a.m. for rev 129. The fallback position, the backup deorbit time would be on orbit number 130. Landing time on orbit number 130 at Northrup in central standard time would be 11:41 a.m. It's also possible on rev 130 to land at Kennedy, landing time at Kennedy on rev 130 in central standard time would be 11:47 a.m. Relationship between Northrup and Kennedy is still that Northrup is prime, and Kennedy is backup. We are in a loss of signal period, we'll reacquire in 1 minutes through Botswana, however, we've had passes going to be at least partially or perhaps entirely reserved for medical conference with the flight surgeon, accordingly. There may be n air-to-ground between the Capcom and the air crew broadcast during that time, in that event the next air-to-ground transmission would be through Hawaii in about a little over an hour. Mission elapsed time is now 7 days 5 hours 6 minutes, thi is Mission Control Houston.

PAO This is Mission Control Houston at 7 days 5 hours 18 minutes, still in a loss of signal period acquire in about 6 minutes through Botswana. Just a point of information, the shif schedule for flight control teams has been established and is as follows, Neil Hutchinson and the Orbit team are presently on console, they will hand over to Tommy Holloway and the Ascent team, beginning at 7:30 p.m. central time this evening. Neil Hutchinson; Flight Director Hutchinson will be available for a change of shift briefing to the news media at 8:30 p.m. central time tonight in the NASA news center building 2, room 135. Again, that Hutchinson change of shift briefing 8:30 p.m. centra time tonight, building 2, room 135. Tommy Holloway and the Ascent team will be on shift until handover beginning at 1:00 a.m. Tuesday, 1:00 a.m. central time. The Holloway change of shift briefing will be at either 2:00 or 2:30 and we will affirm that with him when he becomes available. The Holloway team will handover to Hal Draughon and the Entry team, who, of course will

be on console through touchdown. Let me repeat that once more, the Hutchinson Orbit team, presently on console will begin handover to the Hal Draughon, I'm sorry, correct that, to the Tommy Holloway Ascent team handover beginning at 7:30, Neil Hutchinson will conduct a change of shift briefing at 8:30 p.m. central time in the NASA news center, building 2, room 135.....

END OF TAPE

CAPCOM now the weather at the Cape looks real good. And Columbia, I have a PCS reconfiguration when you're ready to copy. Columbia, Houston, how do you read? Columbia, Houston, how do you read. Columbia, Houston for 4 more minutes, how do you read? Columbia, Houston, how do you read?

PAO This is Shuttle Mission Control, the GC here in th Mission Control Center, GC in the MOCR reports a site problem at Buckhorn.

CAPCOM Columbia, Houston, how do you read? Columbia, Houston for 2 1/2 more minutes, how do you read?

SPACECRAFT Oh, we can hear you now, George, go ahead.

CAPCOM Roger, Jack we had a site problem, I've got your PCS configuration when you're ready.

SPACECRAFT Why don't we do it while you say it, go ahead.

CAPCOM Roger, are you upstairs on L2?

SPACECRAFT Yes, that side's covered. I'll be downstairs and, Gordo will be in L2.

CAPCOM Roger, and then we'll start on MO10W, they're 14.5 cabin reg inlet system 1 to open.

SPACECRAFT 14.7 cab reg one open.

CAPCOM Roger, next H2O tank N2 reg inlet system 2 valve t close.

SPACECRAFT Okay, N2 reg inlet to close.

CAPCOM Next is O2 reg inlet system one valve to open.

SPACECRAFT Okay, now both O2 reg inlets are open.

CAPCOM Okay, the next are upstairs on L2, O2 crossover system 1 and 2 to close.

SPACECRAFT Okay, both the O2 crossovers are closed.

CAPCOM Next is O2 N2 controller valves system 1 to auto, to close.

SPACECRAFT Okay, O2 N2 controller valve system 1 auto.

CAPCOM Roger, and 2 to closed.

SPACECRAFT Okay, we got a spec 666 cabin atmosphere on that and I heard a momentary hiss down at the MO10W area.

CAPCOM Roger, and you can ignore that flow.

SPACECRAFT Okay, thank you. I hadn't heard that one before.

CAPCOM Roger. The next is on L2 N2 system 2 reg inlet to closed. Talkback should go closed.

SPACECRAFT Okay, N2 system 2 reg inlet is closed.

CAPCOM Roger, and we're 30 seconds to LOS and right now back on A-12, we'd like to get APU heater tank fuel line H2O system 3 bravo to auto, is that good?

SPACECRAFT Okay, we got it. I double checked that configuration we had it all the way written down, but we just got 3 bravo to auto, also.

CAPCOM Okay, thank you and going to LOS. Up on O1 you might select O2 N2 flow select, the system 1 O2, over. Roger, and Columbia we'd like to get a cycle on this startracker shutter, over.

PAO Shuttle Mission Control at 7 days 4 hours 50 minutes we've had LOS through Buckhorn and those last commands by the CAPCOM in the blind, meaning that we believe we did have a blink there was sufficient time during that pass for the crew to acknowledge. During that pass the sleep times were uplinked to the crew, there's about an hour and 50 minutes remaining until we put the crew to sleep and wakeup will be at mission elapsed time of 7 days 14 hours 40 minutes, which translates to about 4 a.m. central time tomorrow early wakeup to take advantage of the opportunity for the early deorbit times which were given as orbit, first opportunity to orbit 129, occurring at 8:39 a.m., okay at 10:07 a.m. central time, with the Northrup being the target at that landing. The other opportunity on orbit 130 with landing opportunities at KSC and Northrup. The weather at Kennedy is report.....

END OF TAPE

SPACECRAFT so the star trackers until I get the alignment.

CAPCOM Roger.

SPACECRAFT And as soon as you'd like star 22 or star 19 for IMU alignment. It's only 4 minutes old. I'll talk to them afte that and no IMU alignment attitude required.

CAPCOM That's affirmative.

SPACECRAFT Okay, what else can I do for you George?

CAPCOM Roger, Jack, we're worried about the sun in the Z tracker. We'd like to get the shutter to auto, over.

SPACECRAFT Yea, I see what you mean. I just did that.

CAPCOM Roger, copy that, and Gordo did you say you have the circuit breaker on MA73C, the AC3 payload 3 phase, we'd like that closed.

SPACECRAFT Yes, it's closed.

CAPCOM Roger, on last step of this pallet configuration is back on L1, we'd like flow the proportioning valves loop 1 and 2 to payload heat excanger and when you do that you'll get an SA88 freon flow message and you can ignore that.

SPACECRAFT Okay, we're in payload. No heat exchanger.

CAPCOM Roger, and we're 40 seconds to LOS. The states are next at 442.

SPACECRAFT Okay, anything else we can do for you before you take off. You want us to power up any of experiments or anything or are you going to take care of that?

CAPCOM Roger, we'll do that and one other thing. On page 4-9in bubble six we'd like you to check the heaters on panel A12.

SPACECRAFT Okay, I've done bubble six already. I'll recheck them but that is all taken care of. I don't know what you want me to do with the PCS system however. I will do bubble number 1 if you want me to.

CAPCOM Roger Jack, check those heaters and we'll get that PCS reconfiguration up to you over the states, over.

SPACECRAFT Okay.

PAO This is Shuttle Control. Guam has loss of signal with Columbia. Next acquisition through Buckhorn in 15 minutes.

At 7 days 4 hours 26 minutes mission elapsed time this is Shuttl Control Houston. This is Shuttle Control at 7 days 4 hours 29 minutes mission elapsed time. Because of the short turnaround between shifts for the entry team, flight director, Harold Draughon will not make the change of shift briefing. His substitute will be Gene Kranz, deputy director of flight operations who's currently also involved in flight planning for tomorrow. And because of that his activities in that flight planning, that briefing is delayed until 4:30 p.m. central standard time. The change of shift briefing will be by Gene Kranz, deputy director of flight operations at JSC. The time 4:30 p.m. central at the JSC News Center. This is Shuttle Control.

CAPCOM Columbia Houston through Buckhorn for 7 minutes.

SPACECRAFT Okay, George, hearing you loud and clear through Buckhorn. I lost your star data and I know why and I won't do that again, but rather than going to a new IMU align attitude I presume, I propose that we're gonna scan the same part of the sk and we'll pick up those stars again and just do it when we get some good ones. I did copy down the data though and the biggest angle was the .1. Most of them were around .02. Now, what do you think of that proposal?

CAPCOM Roger, Jack, that sounds good to us. Just a quick overview on what we're thinking tonight. We're planning on putting you to bed here in about 2 hours and we're looking at a wake up around 16 hours MET and we're thinking of deorbit. Our prime opportunity will be on orbit 129. That would be into Northrup at a landing of about 9 o'clock local time there. Our backup would be the next orbit 130 and on that orbit we have the option of either KSC or Northrup, over.

SPACECRAFT Okay, understand 129 to Northrup around 9:30 local or backup of 1:30 to Northrup or KSC, is that affirm?

CAPCOM Roger Jack, that's affirmative. And Jack, that would get us into Northrup in the morning before the wind gets a chance to pick up and if that doesn't work out the weather at th Cape looks real good.

END OF TAPE

SPACECRAFT ...middeck configuration.

CAPCOM Roger Jack, and we'll get back with you on that at Guam.

SPACECRAFT Ok, and on page 4-7 we have done bubble 1 there also.

CAPCOM Roger, we copy that, and we're 20 seconds to LOS, Guam is next at 4 plus 20.

SPACECRAFT Ok, at 4 plus 20, so effectively what we're standing by for is PCS and also GO on verniers, we're still on the normals.

CAPCOM Roger Jack, and we'd like to stay in two GPC computers, over.

SPACECRAFT I figured you did, I'll search that part.

CAPCOM Ok then.

PAO This is Shuttle Control, Columbia out of range at Botswana now, short pass there. Next station is Guam in 28 minutes, Columbia's crew reporting that they have reactivated th star trackers, they've gone back the on orbit middeck configuration and on orbit heater configuration. Columbia is in passive thermal control mode now, the barbeque mode; at 7 days 3 hours 52 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 7 days 4 hours 19 minutes, we're standing by for acquisition through Guam.

CAPCOM Columbia, Houston back through Guam for 6 minutes, over.

SPACECRAFT Well, we're still here wondering around, what can I do for you George?

CAPCOM Roger Jack, you're loud and clear and I've got the four notes to get up to you this pass.

SPACECRAFT I don't understand what you've got, what is it?

CAPCOM Roger, I've got four notes to get up, the first on is in a time and attitude for an IMU maneuver.

SPACECRAFT Say again, George?

CAPCOM Roger Jack, I've got an IMU attitude and time for you, over.

SPACECRAFT Oh, ok standyby one, please. We got the star trackers going by the way, and got some stars in there already.

CAPCOM Roger Jack, and we're seeing your data, we'd like you to get us a Spec 21 if you could, over.

SPACECRAFT Here's Spec 21, you want me tk 4/KII)nZ=kWL @@ +Z/ Spec 22 if you want to see it?

CAPCOM Roger Jack, that won't be necessary. While we're looking at that I have some pallet configuration back on R12, or L12 (correction) when you're ready.

SPACECRAFT I am ready.

CAPCOM Ok, first of all I'd like you to check that the circuit breaker payload timing buffer is closed.

SPACECRAFT Payload timing buffer circuit breaker is closed.

CAPCOM Roger, then close the OFT pallet control circuit breaker.

SPACECRAFT OFT pallet control breaker is closed.

CAPCOM Roger, then we can take the OFT pallet power syste to ON.

SPACECRAFT OFT pallet power system ON.

CAPCOM Roger, then we'd like an IO reset to the SM.

SPACECRAFT Ok, there's IO reset on SM.

CAPCOM Roger, now back on L12, we have checked the OFT pallet power experiment is ON, over.

SPACECRAFT Yeah, I can verify that OFT pallet power experimen is ON, and I got a message when I got that oh, Spec 90 coldplate

CAPCOM Roger Jack, we copy that, and we're looking at it, and the configuration should take care of that, that's coming up

SPACECRAFT Plus an OBC status, spec 91 when you want.

CAPCOM Roger, the next thing we'd like to get is down on the middeck on MA73 Charlie, over.

SPACECRAFT Ok, Gordo's right near there ready, he's going to get that for you.

CAPCOM Roger Jack, and in the meantime, the GNCs report

that your stars look good and you're GO to torque the IMUs, over.

SPACECRAFT Oh, I got that and I bet you're going to say AC3 payload 3 phase, M.

CAPCOM Roger, copy that Gordo, and on the Z star tracker, we'd like you to go back to auto on the shutter, over.

SPACECRAFT Ok, on the shutter on the Z tracker, I just terminated (garble)....

END OF TAPE

CAPCOM Roger, row F, circuit breaker AC1, RMS primary phase A, close that circuit breaker.

SPACECRAFT Ok.

CAPCOM Ok, then the note reads, power up RMS to temp mode on page 3-2 of PDRS ops checklist. You'll have to dig that one out.

SPACECRAFT Yeah.

CAPCOM And finally on panel A8 port RMS heater to auto.

SPACECRAFT I thought I'd just tell you what I'm going to do, and you tell me if I'm wrong, and then we'll find the book later

CAPCOM Ok, Gordo sounds like a good idea, we'll listen up

SPACECRAFT Ok, I'm going to go RMS primary now.

CAPCOM Ok, and the heaters to auto will do it I think.

SPACECRAFT Do a couple of items (garble).

CAPCOM Ok, I'm with you. And next would be to cancel safing.

SPACECRAFT Ok, it's canceled.

CAPCOM And primary select port temp.

SPACECRAFT Ok, port temp and check them off.

SPACECRAFT Ok, let's see, we got the heaters in auto but port temp is selected. I can't get the IO to stay on, do I have to g select first, and then select back off.?

CAPCOM Ok, Gordo forget the RMS stuff for now, and on pag 4-7 bubble 1, we need to complete that before we worry about the RMS, there's some interference on buses.

SPACECRAFT Allright I see what's getting at, ok.

CAPCOM And we're 20 seconds LOS, additionally on page 4-9 in bubble 6 we need to get that pod heaters configured, and we'l see you again. It looks like Botswana in twenty-five minutes.

SPACECRAFT Ok, we'll get back to work here.

PAO This is Shuttle Control, Merritt Island station ha loss of signal, Columbia moving down across South America now toward Botswana the next station on orbit number 116. The crew

busy reconfiguring Columbia to stay on orbit. Gordon Fullerton remarking as Columbia passed over Northrup strip that it was dusty looking down there, and that they agreed with the decision not to land there today. Capcom Brewster Shaw informed him that winds are now gusting to 48 knots at Northrup. Jack Lousma reporting that Houston looks a little overcast, but Galveston is clear. A clock has been started here in the Control Center counting down the crew sleep period, we're going to put them to bed early tonight, and that clock can now, shows the crew 3 hour 15 minutes away from the start of the sleep period. No information yet on when the wake up time will be. But it undoubtably it will be early. At 7 days 3 hours 26 minutes mission elapsed time, this is Shuttle Control Houston.

CAPCOM Columbia, Houston the silver team is back with you through Botswana. We'll be watching you through the night, over

SPACECRAFT Well, silver team you thought you had finished, didn't you, the way you signed off last night, sounds like you all gonna go off and have a party or something, how's it going?

CAPCOM Real good Jack, we've managed to put off our party throwing one more day.

SPACECRAFT That's ok, let me tell you where we are, we're PTC in course, we are still in a single GPC ops, my guesses are rather dual, I guess is you want to stay there, on page 4-9 of the deorbit checklist we have completed bubbles 2, 4, 5, and 6 and I want to ask you about bubble 1, if you want to go with tha PCS configuration.

CAPCOM Roger Jack, and we'll get back with you on that at Guam.

SPACECRAFT Ok, and on page 4-7 we have done bubble 1 there also.

CAPCOM Roger, we copy that, and we're 20 seconds to LOS, Guam.....

END OF TAPE

CAPCOM Columbia, Houston through Buckhorn for 15 minutes, over.

SPACECRAFT Okay, Brewster you're loud and clear.

CAPCOM Roger, does someone have access to the flight deck for some more clean up switching?

SPACECRAFT Okay, I'm right here.

CAPCOM Okay, Gordo, on panel L1 the flash EVAP controller 3 of them to off.

SPACECRAFT Flash EVAP's are off. All three.

CAPCOM Okay. And the same panel, top is ap heater, nozzl left and right 2 to off and the duct to off and the high load duct heater to off. And you may get an SA 88 thermal EVAP message.

SPACECRAFT Okay, it's all done.

CAPCOM Okay, the next switch throw is back on panel A11.

SPACECRAFT I noticed the highload of that is still enabled.

CAPCOM You can go to inhibit on that, Gordo, good catch.

SPACECRAFT Okay, off is, position is off. And on All, Now I know what it was.

CAPCOM That's affirm, Gordo, on A11 cryo 02 and H2 tank 4 A heaters to auto.

SPACECRAFT Okay, both tanks (garble) heaters, A heaters are auto.

CAPCOM Roger, thank you. And Gordo, we're just trying to get as much as we can out of tank 4 and we'll be getting those heaters off before sleep.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, we're looking at the DAP configuration it looks like that discrete rate for normal would be .3 and it should be .404.

SPACECRAFT I did not know whether you meant that. (garble) formal call once I got there. I had to jack it up to 23 to get there in time and I plan to change it for the PTC.

CAPCOM Okay, Gordo, that'll work fine. We thought you

might go ahead and use it then, but as long as you have it for the PTC that's fine.

SPACECRAFT Okay. Are we getting, this is the start time crucial or are you working on some payload data for phasing and so forth?

CAPCOM Gordo, looks like you make that attitude alright and the start time of 3 hours 15 minutes is critical.

SPACECRAFT Okay, we're going, we'll get that.

CAPCOM Okay, if you cannot make that or don't think you'l make it, let us know and we'll get you a new time.

SPACECRAFT Looks like we got her made here, Brewster.

CAPCOM Okay, Jack, that's fine.

SPACECRAFT If you'll look at the big map there maybe it's oh beg your pardon, we're looking at Northrup strip right now and i is dusty-looking down there.

CAPCOM Sure is, the vis on the surface is about 0.

SPACECRAFT Well, I guess we kind of agree with your decision there for today.

CAPCOM The last gust report we got was 48 knots. Columbi your attitude and rotation look good.

SPACECRAFT Okay I got it. Very interestingly it looks like all the dust was raked on White Sands. I didn't see any dust blowing anywhere else in the area.

CAPCOM Copy.

SPACECRAFT May be the big man wants his rocket back Brewster.

CAPCOM Maybe so sir.

SPACECRAFT Looks like it's a litle overcast over Houston but it cleared up in Galveston today too, Brewster.

CAPCOM Okay, Jack, thanks for weather report. Can't see i from here. Columbia, Houston, we're seeing some temperatures go down. We'd like to reconfigure for you to keep up if you have a moment.

SPACECRAFT Go ahead.

CAPCOM Okay, the first is to get the RMS configured and o MA 73 Charley, we need to close the circuit breaker.

SPACECRAFT Go ahead.

CAPCOM Roger, row F circuit breaker AC1 RMS primary phase A. Close that circuit breaker.

SPACECRAFT Okay.

CAPCOM Okay, then the note reads power up RMS to temp mod on page 3-2 ....

END OF TAPE

SPACECRAFT Their still both deselected. You want to reselect them now so we don't forget later?

CAPCOM Stand by one, we'll look at it. Gordo, you can reselect those now, but hold off on the verniers until we call you, and it looks like it'll be about an hour and a half to heat things up enough.

SPACECRAFT Okay. You might take a look at DAP, the book here calls for B-DAP on a normal, and it looks like kind of a small deadband on big rate and you might see what's out there for fuel conservation here.

CAPCOM Okay, we'll look at that. And Gordo, you can go with DAP A for now.

SPACECRAFT Okay, running DAP A.

CAPCOM Columbia, Houston, we're 25 seconds to LOS, we may or may not get you at Hawaii, it's very low elevation. Buckhorn would be after that in about 16 minutes and just press on with what your doing, you're doing all the right things.

SPACECRAFT Okay, and I assume you want us to go on -ZLV when the opportunity arises, right?

CAPCOM We will get you a attitude for PTC Jack where your not going to use the ZLV.

SPACECRAFT Okay, good.

PAO This is Shuttle Control, Guam has loss of signal with Columbia. Hawaii next in 9 minutes. At 7 days 2 hours 55 minutes mission elapsed time, this is Shuttle Control Houston.

CAPCOM Columbia, Houston through Hawaii. Columbia, Houston through Hawaii, over.

SPACECRAFT We got you loud and clear.

CAPCOM Okay Gordo, I have a DAP change and an attitude to go to and then we'll get you a rotating at 15 minutes past the hour.

SPACECRAFT Okay, ready to copy.

CAPCOM Okay, change DAP A7, that's alpha seven, rotation discrete rate normal to .404, over.

SPACECRAFT Okay I understand, discrete rate normal .404.

CAPCOM Roger, the attitude is: roll 149.8, pitch 187.9, yaw 86.7, over.

SPACECRAFT Okay, 149.8, 187.9, and 86.7.

CAPCOM Roger, you can go to that attitude now, and PTC maneuver will be body vector plus one, DAP A auto normal, and initiate rotation at 3 hours 15 minutes.

SPACECRAFT Okay, we'll start the PTC at 03:15 using body vector plus one, and A auto normal.

CAPCOM That's a good read back Gordo, that'll put the nos toward celestial north and it'll be like the attitude last night.

SPACECRAFT ... again, for a study of Polaris.

CAPCOM Roger. Columbia, Houston, we're 20 seconds LOS, Buckhorn's next in 4 minutes.

SPACECRAFT Thank you.

PAO This is Shuttle Control, at 7 days 3 hours 5 minut mission elapsed time. Next acquisition is through Buckhorn in 3 minutes. Flight Director Neil Hutchinson and the orbit team of flight controllers has taken over in the mission control center. Flight Director Harold Draughon is now involved in flight planning for tomorrow's landing opportunities. He still estimates his change of shift briefing for 3:30 p.m. central tim in the JSC news center. This is Shuttle Control, Columbia's about 30 seconds away from acquisition through Buckhorn, we'll stand by.

CAPCOM Columbia, Houston through Buckhorn for 15 minutes, over.

SPACECRAFT Okay, Brewster you're loud and clear.

CAPCOM Roger, does someone have access to the flight deck for some more clean up switching?

SPACECRAFT I do, I'm right here.

END OF TAPE

PAO We're 11 minutes 45 seconds away from acquisition through Yarragadee on orbit 115. At 7 days 2 hours 22 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 7 days 2 hours 33 minutes mission elapsed time. Yarragadee is about to acquire Columbia.

CAPCOM Columbia, Houston, through Yarragadee for 5 minutes, over. Columbia, Houston, through Yarragadee for 5 minutes, over. Columbia, Houston, through Yarragadee for 4 minutes, over.

CAPCOM Columbia, Houston, how do you read?

SPACECRAFT Houston, Columbia, how do you read?

PAO This is Shuttle Control. INCO believes the crew may be getting out of their suits and therefore aren't on their communications headsets. We'll continue to standby.

CAPCOM Columbia, Houston, through Yarragadee for 2 and 1/ minutes, over.

SPACECRAFT Hello there, Brewster. We are right now opening the starboard door.

CAPCOM That's good news Jack.

SPACECRAFT We, we're just below bubble 3 on page 4-5. Deorbi book.

CAPCOM Roger Jack, we're with you. Columbia, Houston, 30 seconds this pass. Next is Guam in 7 minutes.

SPACECRAFT Okay, we'll see you at Guam. We got the left door coming open.

CAPCOM You're way ahead of us, Jack.

PAO This is Shuttle Control. Columbia out of range at Yarragadee. Will begin it's 116th orbit at Guam acquisition in minutes. Jack Lousma reported the payload bay doors open at los of signal here at Yarragadee. This team of flight controllers i expected to hand over to a new team at 3 p.m. central time today so at this time we're estimating a change of shift briefing with flight director Harold Draughon at 3:30 p.m. central time in the JSC News Center. Repeat, we anticipate a change of shift news conference with flight director Harold Draughon at 3:30 p.m. central time in the JSC News Center. At 7 days 2 hours 41 minutes mission elapsed time this is Shuttle Control Houston.

CAPCOM Columbia, Houston, through Guam for 6 minutes, over.

SPACECRAFT Okay Brewster, we got the doors open and thermal (garble) back in ops 2 and we're wondering where we ought to go from here attitude wise, you like it like it is?

CAPCOM We're working on that right now, Jack, we'll have something for you shortly. I have a couple of switches in the aft if you have time.

SPACECRAFT Go ahead.

CAPCOM On R10 the MS audio air to ground 2 to T slash R, over.

SPACECRAFT Okay, we got the air to ground 2 TR of the mission station audio panel.

CAPCOM Okay, and on panel R11 Charley the OEX power off.

SPACECRAFT OEX power's off.

CAPCOM Thank you and Jack, your config so far looks real good red flows right on.

SPACECRAFT Alright that's the good news. Are you going to give us a go before we go to verniers and unless you want to let us warm up for awhile, heh?

CAPCOM That's affirm, Gordo. Columbia, Houston, since you're in OPS 2 we'd like a spec 23 item 5 to enable the interconnect gauging.

SPACECRAFT Okay, we got an item 5 and also we got another wea message that I never told you about on the forward pod. They're still both deselective. You want to reselect them now so we don't forget later?

CAPCOM Standby 1, we'll look at it. Gordo, you can reselect those now but hold off on the verniers till we call you and it looks like it'll be an hour and half to heat things up enough.

END OF TAPE

PAO base center which is forecast to have the best weather for tomorrow. Here in the control center flight plannin is getting underway to support a landing at KSC. We will continue to watch the weather at Northrup because we prefer to land at Northrup if at all possible. In any event we do not wan to delay a landing beyond tomorrow because the KSC weather for Wednesday is forecast to be bad. As soon as we have information on what orbit and at what time we will land tomorrow we will com up on the loop and give you that. Columbia's crew now backing out of the reentry configuration that they had started into. They'll be opening the payload bay doors and getting back on an onorbit configuration, getting back in the onorbit computer program. As Jack Lousma the Columbia's commander termed it, "we've had a good drill," he said. Botswana's next in three minutes. At 7 days 2 hours 11 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 7 days 2 hours 14 minutes mission elapsed time. Shuttle coming up on acquisition at Botswana.

CAPCOM Columbia, Houston through Botswana for 5 minutes, over.

SPACECRAFT Loud and clear, Steve. We're back on the HAU and thinking about getting out of the seats.

CAPCOM Okay, let us know when you're out.

SPACECRAFT Okay, Steve, what can I do for you? We're in the back of the bus.

CAPCOM Okay, we got a couple of switches on R11. Number on row echo, the wideband mission power needs to come off, O F F again Jack.

SPACECRAFT Okay, that's off, go ahead.

CAPCOM The second on R11 row golf, the PCM recorder rotar switch to stop, please.

SPACECRAFT Okay, PCM recorder rotary's in stop.

CAPCOM And that's all I have for now Jack.

SPACECRAFT Okay.

CAPCOM Columbia Houston, Jack, if you do have the deorbit prep out I have a minor change on page 4-9.

SPACECRAFT Okay, Steve, standby till I get that page, go ahead.

CAPCOM Okay, at the bottom of page 4-9, right hand columr

bubble 6 add panel R4 hydraulic brake heater 3 of them off, O F F.

SPACECRAFT Roger, R4 hydraulic brake heater 3 off.

CAPCOM Thank you, we're 20 seconds LOS. Next is Yarragadee in 14 minutes.

SPACECRAFT Okay, we're both free of the seats and staring to plug through the (garble) heir sigmas.

CAPCOM Roger.

PAO This is Shuttle Control. Columbia out of range nc at Botswana. The crew getting out of the seats. They'll be taking off their pressure suits. To recap we've waved off a landing for today. Columbia will land tomorrow and according to Dr. Cristopher C. Kraft, Jr., director of the Johnson Space Center the probabilities are high that we may go to the Kennedy Space Center tomorrow. The weather at KSC is forecast to be better there than at any other landing site. We'll continue to watch the weather at Northrup very closely because we do prefer to go to Northrup and we will if at all possible go into Northru tomorrow. Flight planning is underway now to support landings at either of those locations and we'll get back to you with information based on that planning as soon as it's available. W do not know yet when this entry team will break. Obviously, we'll go into a shift change with other flight control teams and flight director Harold Draughon will be having a change of shift briefing but we have no time on that yet. We'll give it to you as soon as it's available. We're 11 minutes 45 seconds away frc acquisition through Yarragadee on orbit 115. At 7 days 2 hours 22 minutes mission elapsed time this is Shuttle Control Houston.

END OF TAPE

CAPCOM Columbia, Houston through Ascension, over.

SPACECRAFT Read you loud and clear, Steve. How me?

CAPCOM Roger, got you five by, Jack, we talked to the ST again between Bermuda and Ascension and as you could probably surmise the winds have been coming up all day, it was still acceptable until this last pass but during John's last pass the visibilities were unacceptable and the turbulence was severe so it's not a good day, and we're going to wave off for 24 hours, over.

SPACECRAFT Okay

SPACECRAFT Well, we've had a good drill.

CAPCOM You guys are really good at this stuff and you were on and ahead of the timeline all the way. We'll have a few immediate action switches for you and then reference you to section 4 of the deorbit prep backout procedures and we'll just backout right by the checklist.

SPACECRAFT Okay, we're strapped in the seats so we're not to mobile at the moment. If we get the immediate switches and they're nearby, we'll get them.

CAPCOM Roger, one of those is on panel C3. We need the DFI PCM recorder to low sample, Jack.

SPACECRAFT Okay, DFI PCM low sample.

CAPCOM And Columbia, Houston we would like to set up an interconnect again, we'll interconnect from the left OMS with a caution use the left OMS crossfeed A to open, but leave the brav in GPC, over.

SPACECRAFT Okay, I understand we want to go interconnect fro the left using the A crossfeed valve.

CAPCOM That is correct, Gordo.

SPACECRAFT Okay, you've directed me to page 4-3 of the deorbit timeline to backout, right?

CAPCOM That's affirmative Jack, you'll see a continuous on in MET across Yarragadee where you would have burned normally and then picks up the timeline.

SPACECRAFT Okay, Steve a question about this. Burn ops 3, c course the OPS 3 procedures are interconnect so's the helium, OM helium open, and they haven't been opened yet. I assume...

CAPCOM Standby. Gordo, we want to leave the helium valves closed for now, we'll get back to you.

SPACECRAFT Okay, We'll just ... unless you want me to wait altogether.

CAPCOM Gordo, one other thing. We would like you to backout of the APU prestart and the reference for that is page 3 6 at the bottom.

SPACECRAFT Okay.

CAPCOM That's 3-6 of the Entry checklist.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT Okay, the last talk we had about the interconnect I wasn't sure whether you said standby on the whole interconnect or just what.

CAPCOM Wait one. Gordo, we want to set up that interconnect now, and the way we described, over.

SPACECRAFT Okay, we'll do that.

CAPCOM And Columbia, Houston, we're 30 seconds LOS, we'l see you next at Botswana in 6 minutes.

SPACECRAFT Okay Steve, we'll see you in Botswana we're gonna start backing out immediately.

CAPCOM Okay, sorry about that.

SPACECRAFT Well, that's the breaks of space, I guess. It wa a good drill, though, a real good simulation. We ought to be ready tomorrow and looking forward to getting the forecast for White Sands tomorrow.

CAPCOM This was one more last SIM with you.

PAO This is Shuttle Control Columbia out of range now at Ascension heading toward Botswana in five minutes. The possibilities are high that Columbia will land tomorrow at the Kennedy Space Center runway. The best weather appears to be at KSC.

SPACECRAFT (garble) area. You might take a look.

CAPCOM We'll see if it looks good Gordo and we'll pick you up at Botswana.

SPACECRAFT Okay.

PAO Had a late LOS there, Columbia was in a keyhole. To recap, the probabilities are high that Columbia will land at the Kennedy Space Center, which is forecasted to have the best weather for tomorrow. Here in the control center, flight planning is getting underway to support a landing at KSC. We will continue to watch the weather at Northup because we prefer to land at.....

END OF TAPE

SPACECRAFT Okay, will do.

CAPCOM Columbia Houston, we've got 2 and 1/2 minutes left over the CONUS here. If you do have the time now I can update the winds for you and then Joe can talk to you over Ascension. I not we'll get it all at Ascension, over

SPACECRAFT Okay go ahead.

CAPCOM Okay, if you're ready to listen to the winds at these are STA winds from the last pass that John made at 40,000 4 4 at 132, at 30,000 2 2 5 at 1 1 7, 25,000 2 5 3 at 1 4 0, 20,000 2 5 0 at 1 2 0, 15,000 are 2 4 5 at 1 0 5, 10,000 2 4 0 a 6 8 and at 7,000 2 5 5 at 7 0. On the surface they're presently out of the southwest at 2 2 5 at 24 knots and gusting. Our recommendation will possibly be runway 2 3 with a left turn and Joe will give you more specific words over Ascension.

SPACECRAFT Okay, thank you Steve.

CAPCOM Pretty windy day.

SPACECRAFT Say again the winds at 30,000.

CAPCOM At 30,000 they were 2 2 5 at 117, 1 1 7 knots Jack

SPACECRAFT Okay, good.

CAPCOM Columbia Houston, we're 30 seconds to LOS. Ascension is next in 9 minutes and Jack, you might give some consideration to a right hand turn to 2 3, it keeps the g's dow a little bit. It's a 150 degree turn verus 220 degree turn the left way around.

SPACECRAFT Roger.

PAO This is Shuttle Control. Bermuda has loss of signal. Columbia now heading toward Ascension Island on orbit number 115. At Ascension, astronaut, Joe Engel, will discuss t situation at Northrup with the crew. It's possible we will switch to runway 2 3, and it's not it has not yet been decided whether that it will be a left hand turn or a right hand turn. Right hand turn would require a 150 degree turn versus 220 degrees for left hand. We're 8 and 1/2 minutes away from acquisition at Ascension.

CAPCOM NASA 947, Houston

PAO And 39 minutes away from deorbit. It's 7 days 1 hour 54 minutes mission elapsed time. This is Shuttle Control Houston.

CAPCOM Columbia, Houston, as an outline for this pass across the States, we've got the APU pre-start, the gimble check and I have an update of the latest winds from the STA for you, and then Joe has a few words to pass along from John about the final approach and landing, and we'll let you sort out during this pass when is the best time for you to accomplish all this with us.

SPACECRAFT Houston, Columbia,

CAPCOM Go ahead.

SPACECRAFT Okay, about halfway through that conversation, th transmission, I got my COMMs terminated here but, we got it plugged back in and you'll have to say that again.

CAPCOM Okay Gordo, all I was saying was over this CONUS pass we've got the APU pre-start, the gimbal check, and I do ha the latest winds from the STA and Joe would like to relay some comments from John about flying the STA in the final approach a landing, and we'll let you sort out during the pass when it's best for you to do that.

SPACECRAFT Okay, Jack's not back on COMM yet, so I'll hold o on some of that at least, and just give me parts of it occasionaly when you think we're going to run out of time to do all that.

CAPCOM Okay, if you're ready we can go ahead and do the APU pre-start now Gordo.

SPACECRAFT Okay. Steve, you want me just do the pre-start stuff in the entry checklist here, is that correct?

CAPCOM That's affirmative Gordo, and if you're busy with something else we've got plenty of time on this pass.

SPACECRAFT No, I'll go ahead and get it done. We're not ful strapped in yet, but we might as well get it done.

SPACECRAFT Okay, Steve how do you read?

CAPCOM Jack, I got you 5 by.

SPACECRAFT And Houston, is there a way to disable that smoke detection which keeps going out. It's gonna be distracting for quite a while here?

CAPCOM Stand by. And Gordo, we're standing by for the tank valves on the APUs, over.

CAPCOM John, can you give us some data from your last pass?

NASA 947 Well, it was, there was about 2 miles of visibilit on runway 1 7 and runway 2 3 it's covered up in sand. I think w ought to knock this off, over.

CAPCOM Okay, we got you John, we copy and concur.

NASA 947 That last run was so bad that it disengaged CMD i turburlence. First time I ever seen that.

CAPCOM Copy that. And John, thank you very much. We'll be signing off here.

NASA 947 Hey, I'm sorry you guys.

CAPCOM Not your fault. Thanks for the call John.

PAO This is Shuttle Control. We're going to do a wave off on the landing today. There'll be no landing today for Columbia. We'll continue to standby for acquisition through Ascension but the situation has degraded at Northrup enough that we'll wave off for today. This is Shuttle Control at 7 days 2 hours 2 minutes mission elaped time. Columbia approaching the range of the Ascension Island station where Astronaut Joe Engle, the commander of STS-2, will talk to the crew. We'll have to start backing out of some of the configuration we're in, get the payload bay doors open and we will be staying on orbit for a while yet. We'll standby for communications through Ascension.

CAPCOM Columbia Houston, through Ascension, over.

SPACECRAFT Reading you loud and clear, Steve, how me?

CAPCOM Roger, got you five by, Jack, we talked to the STA again between Bermuda and Ascension, and as you can probably surmise the winds have been coming up all day. It was still acceptable until.....

END OF TAPE

SPACECRAFT Okay, they're open. And I had 3 grays. And I'll set up a gimbal check for you.

CAPCOM Roger, APUs look good, you can secure those, and we're standing by for the gimbal check Jack. And Jack, please stand by on the gimbal check, we don't have data momentarily.

SPACECRAFT Okay.

CAPCOM And Columbia, you're go for the gimbal check now.

SPACECRAFT Okay, check the top sun attitude now Steve.

CAPCOM Say again Jack?

SPACECRAFT Check the top sun attitude now.

CAPCOM Roger, we'll check it. Attitude is okay Jack.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, we've seen the secondary gimbal and we're ready for the primaries now.

SPACECRAFT Okay. Okay here come the primaries, I'll try agai the secondaries after I get my boots off.

CAPCOM Roger. Columbia, Houston, the gimbal check does look good and we have a circuit breaker for you, if you want to get rid of the alarm for aft bay 2.

SPACECRAFT Okay what is it please?

CAPCOM Jack, in panel 014 row charlie, smoke detection ba 2 alpha 3 bravo, you can pull that one.

SPACeCkAFT Give me that nomenclature again Steve?

CAPCOM Okay Gordo, it's on 014 row charlie, smoke detection bay 2 kLbha 3 bravo, 60r.

SPACECRAFT Okay, I got it, thank you.

CAPCOM And we show that you have it. And Columbia, Houston, one last thing, the BFS is on internal time. We need t pro it into ops 0 and then back to 301 Gordo.

SPACECRAFT Okay, will do.

NASA 946 (JOHN YOUNG) Obviously going into 23, you go to turn inside the back about 15 degrees for those winds, and put your speed brakes in, and then you know, bank it about 45 degrees and fly 245 all the way around. But it's durable.

CAPCOM Ok, we copy that. And John, that's all we can think to ask you, I'll contact you next after Bermuda at about 11:53 Houston time.

JOHN YOUNG Ok.

CAPCOM Thank you.

PAO This is Shuttle Control, talking to John Young in the shuttle training aircraft at this time was both Steve Nagel and astronaut Joe Engle, the commander of STS-2.

PAO This is Shuttle Control, there has been no decisic yet to redesignate to runway 23. If that decision is made, we'l inform you.

PAO This is Shuttle Control.....

CAPCOM Columbia, Houston through Hawaii for 6 minutes, over.

SPACECRAFT Say Steve, loud and clear, how are we?

CAPCOM You're loud and clear.

SPACECRAFT Ok, a couple of things for you, we're out in sea now, not quite done with bubble two. We're getting....well, on thing you might see on the data, I inadvertently (garble) moded, (garble) two, I think it was, but I dropped out of it when I wa doing a checkpoint. We're getting a MB3 firelight, it's come o three times, MB2, I'm sorry. MB2, the concentration shows zero when we look at the system. And that's just smoke detector A circuit, B circuit is not going on.

CAPCOM Ok, we believe that's a bad detector, everything looks good to us, configure AOS, please.

CAPCOM And Columbia, Houston, two things, you can anticipate over the CONUS if you're ahead of the timeline and earlier APU prestart and gimble check, over.

SPACECRAFT Contact.

CAPCOM And secondly, somebody's at the back on panel R11 echo, we need that wideband mission power switch to on (ON) now please.

SPACECRAFT Ok, wideband mission power ON.

CAPCOM Columbia, Houston, we've got a revision to the top sun attitude, for you.

SPACECRAFT Go ahead.

CAPCOM Roger, roll is +182.9, pitch +109.3, and yaw 332.5 Jack.

SPACECRAFT Ok, 182.9, 109.3, and 332.5, thank you.

CAPCOM That's a good readback.

CAPCOM Columbia, Houston we're 30 seconds LOS, see you at the states in three minutes.

SPACECRAFT Ok.

PAO This is Shuttle Control, Hawaii has loss of signal with Columbia, the ops 3, the entry and landing computer program has been entered in Columbia's computer. Next station is Goldstone and Buckhorn in 2 and a half minutes. That's 7 days, hour, 32 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 7 days 1 hour 34 minute mission elapsed time. Columbia about 30 seconds away from Buckhorn.

CAPCOM Columbia, Houston back with you through Buckhorn for 10 minutes, over.

SPACECRAFT Allright, loud and clear.

CAPCOM Roger, configure AOS and your APU number for pretake start is number 1 with number 2 as a backup, over.

SPACECRAFT Ok, we'll go in numerical order.

CAPCOM Columbia, Houston as an outline for this pass across the states, we've got the APU prestart, the gimble check, and I have an update of the latest winds from the STA for you. And then Joe has a few words to pass along from John about the final approach and landing. And we'll let you sort out during this pass when's the best time for you to accomplish all this with us.

END OF TAPE

PAO A turn on the order 90 degrees or slightly more compared to a turn exceeding 270 degrees for the left hand turn. This right hand turn is into runway 1 7, essentially into the south. With such a big sweeping turn if Columbia turned to the left the winds would have a tendency to blow it down the range and the only way to stay on course would be to steepen the bank which could lead to excessive g forces, so a right hand turn is preferred. At 7 days 1 hour 8 minutes mission elapsed time this is Shuttle Control Houston.

CAPCOM NASA 9 4 7 Houston.

NASA 947 Read you loud and clear, over.

CAPCOM Check at you five by 9 4 7, go ahead.

NASA 947 Roger, we're looking at a increase in winds up here at 3 5 0 above ground level is 244 at 132, at 30,000 225 at 117, 25,000 2 5 3 at 140, 20,000 2 5 0 at 120, 15,000 2 4 5 at 105, 10,000 2 4 0 at 68 and 7,000 with 255 at 70. We think we may have a 10 knot airspeed wind error in the-they may be reading about 10 knots too high. Are you all getting the surface winds from that tower, over?

CAPCOM Yes we are. We're presently talking to Rick Howe, do you have any input there?

NASA 947 No, the runway visibility and aim point marks are all good from here right now.

CAPCOM Copy that, good vis and aim points are visible, and exposition at touchdown, please?

NASA 947 We're just starting the run right now.

CAPCOM Okay, we'll just standby on this freq, we've got about 13 or 14 minutes available, John. NASA 947 Houston.

NASA 947 947 over.

CAPCOM Okay, we're back with you loud and clear, ready to hear your report from the last run, John.

NASA 947 Okay, the surface winds are 2 2 5 at 24 and so our approach with a low energy approach to avoid this turbulence, but everything seems to be working okay. Visibility is down across the end of runway there on 1 7 right now. And blowing sand but it's wide open on the first three miles of the approach end, over.

CAPCOM John, did you say the vis was down at the approach

NASA 947 At the far end of 1 7 the visibility's down.

CAPCOM Copy that, at the far end, did the winds aloft remain about the same?

NASA 947 The winds aloft are the ones that I read you before.

CAPCOM Okay, we copy that. How about the touchdown point for 1 7?

NASA 947 They're pretty brisk.

CAPCOM Roger, how about the X position at touchdown for 1 7 John?

NASA 947 We were low energy

CAPCOM Okay.

NASA 947 Okay, we were low energy into preflow. We're 268 knots and we're 100, 200 feet over the threshold but we still go 6,000 feet north of that that we can land on.

CAPCOM Roger. John, two questions. Number 1, how did th TACAN work this time and number 2, would you recommend runway 2 with the winds you had on the surface?

NASA 947 That's affirmative. We'd recommend 2 3 with that kind of runway.

CAPCOM Okay. John, what you might do if you have time is set up a run into 2 3 and see if you got to use any particular techniques with those winds blowing like they are down as low in the pattern like that.

NASA 947 Okay, we'll set up one right now.

CAPCOM Okay, and any comments that you have on that might be worthwhile passing onto Jack like what you're seeing in the way of how to glide slope crab and how it fades out when you get down low or cutting the HAC shorter or anything like that we'd appreciate. We'll pass that onto him over stateside pass then.

NASA 947 Obviously, going into 2 3 you got to turn inside the HAC about 15 degrees with those winds and put your speedbrakes in and you know bank it about 45 degrees and fly 245 all the way around, but it's doable.

END OF TAPE

SPACECRAFT ...Yarragadee.

PAO This is Shuttle Control. Columbia's over the Indian Ocean now out of range at Botswana. Next station is Yarragadee in 12 and 1/2 minutes. We're 1 hour 46 minutes 45 seconds away from deorbit. At 7 days 47 minutes mission elapsed time, this is Shuttle Control Houston.

CAPCOM Columbia, Houston through Yarragadee for 7 minutes over.

SPACECRAFT Okay Steve, how do you read?

CAPCOM Got you 5 by Gordo, how us?

SPACECRAFT Okay, good. We just had in RCS jet fail leak on forward manifold 5, I'm watching the helium and it's absolutely rock steady, I'm guessing that they turned the heater off, that jet just cooled off and faked out the temperature transducer, over

CAPCOM Stand by Gordo.

SPACECRAFT I didn't close the manifold, I will if you think it's a good idea.

CAPCOM Negative, we concur with you, we believe it's a false fail leak, and you can continue on Gordo.

SPACECRAFT Okay, I'll give you a couple of numbers so when yo get data, you can, or maybe you can look at the last data you had. The helium oxidizer is 1880, and fuel is 1760.

CAPCOM Copy that, thank you.

SPACECRAFT And Houston, we got a good IMU alignment and also, IMU alignment verification.

CAPCOM Copy that, if you have the time we'll take the torquing angles Jack.

SPACECRAFT Okay, the torquing angles, star 16 and 23, IMU 1 -.02, plus .00, -.14. IMU 2, -.04, plus 00, plus .11, IMU 3, -.05, plus .08, -.02, torque 01, 52, 45 TIG time.

CAPCOM Copy that, thank you.

SPACECRAFT Yes sir.

CAPCOM And Columbia, one question, did the DFI PCM rewind go okay?

SPACECRAFT Yes sir, it looks normal to me.

CAPCOM Thank you.

SPACECRAFT And we're to the top sun attitude.

CAPCOM Roger. Columbia, Houston, one note of interest. The burn TIG will occur on the next time around about 18 seconds after AOS at Yarragadee.

SPACECRAFT Okay, thank you and how's the winds and so forth holding up at Northrup?

CAPCOM Well so far so good, and we're checking that for you, I hope to have more words at Hawaii Jack.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, we're 30 seconds LOS, next is Hawaii in 19 minutes, over.

SPACECRAFT Okay, see you at Hawaii Steve.

PAO This is Shuttle Control. Yarragadee has loss of signal with Hawaii next in 18 minutes. Columbia will begin its orbit number 115 prior to acquisition at Hawaii. And we informe the crew on this pass that the deorbit ignition will begin 18 seconds after Yarragadee acquisition of signal on orbit number 115. We hope to have more information for the crew on the winds at Northrup during this next pass at Hawaii. Columbia's ground track across the United States will not change because of the right hand turn into runway 17, this turn will be made at somewhere around 22,000 ft. that's estimated. And it's a turn o the order of 90 degrees or slightly more compared to a turn exceeding 270 degrees for the left hand turn. This right hand turn is into runway 17 essentially into the south. With such a big sweeping turn if Columbia turned to the left the winds would have a tendency to blow it down the range and the only way to stay on course would be to steepen the bank which could lead to excessive G forces, so a right hand turn is preferred. At 7 day 1 hours 8 minutes.....

END OF TAPE

CAPCOM Roger, we copy that Jack.

SPACECRAFT Ok.

CAPCOM Columbia, Houston we're 20 seconds LOS, Dakar is next in four minutes.

SPACECRAFT Ok.

PAO This is Shuttle Control, Bermuda has loss of signal, the flight dynamics officer on the entry team; Craig Staresinich has generated some new entry elapsed times. The event times changed only by a few seconds from those that were released earlier. The entry interface time is now 7 days 2 hou 56 minutes 59 seconds at an altitude of 404,000 feet, and at a range from the landing site of 4,166 miles. Blackout will begi at 7 days 2 hours 59 minutes 44 seconds at an altitude of 318,0 feet and a range of 3,500 miles. Blackout projected to end at days 3 hours 14 minutes 37 seconds at 170,000 feet and a range 498 miles. Touchdown at 7 days 3 hours 27 minutes 30 seconds. This is to runway 17 at Northrup strip with a right hand turn. Columbia is two minutes away from acquisition through Dakar, we'll standby.

CAPCOM Columbia, Houston through Dakar for 10 minutes, over.

CAPCOM Columbia, Houston through Dakar for 10 minutes, over.

SPACECRAFT Ok, Brewster, we're hearing you through Dakar.

CAPCOM Got you 5 by Jack.

CAPCOM Columbia, Houston at your convenience, we'd like verify that the runway table has been set up with Northrup runways 23, 17 and 05 in order. And you have a GO for the ops transition.

SPACECRAFT Ok, GO for ops 3, the landing site updates in order; Northrup 23, Northrup 17, and Northrup 05.

CAPCOM Roger that, and the MLS channels for Northrup 17 channel 8.

SPACECRAFT Channel 8, thank you.

SPACECRAFT Okay, the second installment of the rad heater, heat sink DTO went nominal, again.

CAPCOM Thank you, Jack.

SPACECRAFT Sir, I've come to the place where it says check wideband mission power on, is that a turnaround?

CAPCOM Gordo, we don't want to do that yet, we anticipate Yarragadee at the earliest.

SPACECRAFT Ok, we'll leave her off, don't let us forget it.

CAPCOM We'll remind you.

CAPCOM Columbia, Houston 30 seconds LOS, Botswana next in five minutes.

SPACECRAFT Steve, we'll see you in Botswana.

CAPCOM Roger.

PAO This is Shuttle Control, Columbia has loss of signal at Ascension moving now toward the coast of Africa, the west coast of Africa on its 114th orbit. The Botswana station will pick up Columbia in 4 and a half minutes. At 7 days 35 minutes, this is Shuttle Control Houston.

CAPCOM Columbia, Houston through Botswana for 6 and a hal minutes, over.

SPACECRAFT Hello through Botswana, we're doing an IMU alignment.

CAPCOM Copy that.

CAPCOM Columbia, Houston we're 30 seconds LOS, next is Yarragadee in 13 minutes.

SPACECRAFT Ok, we'll see you in Yarragadee.

PAO This is Shuttle Control, Columbia is over the Indian Ocean now out of range at Botswana. Next station is Yarragadee in 12 and a half minutes.

END OF TAPE

CAPCOM TIG is 0 0 7, 0 2, 3 4, 0 0 . 0. 1 5 5 0 9, - 0 . 6 2 3 7, 0 6 5 . 8 3 2, 0 9 5 .4 8 8, all balls, and delete PEG 7, over.

SPACECRAFT Okay we copy both OMS. TD roll 1 8 0, + 0 . 1, - . 7, + 5 . 7, 2 1 5 4 9 2, 0 0 7, 0 2, 3 4, 3 balls, 1 5 5 0 9, - 0 6 2 3 7, 0 6 5 8 3 2, 0 9 5 4 8 8, all balls, delete take 7.

CAPCOM That's a good read back. Continuing with burn attitude. 1 5 3 1 0 9, 3 3 3, 4 1 6 6, 2 0 1 9, delta V total 0 2 8 6 . 2, 0 2 3 8, vigo X + 0 2 7 5 . 5 3, all balls, + 0 7 7 . 5 3, HA 1 2 3, HP - 0 1 9, read back.

SPACECRAFT 3 1 0 9, 3 3 3, 4 1 6 6, 2 0 1 9, 0 2 8 6 . 2, 0 2 3 8, + 0 2 7 5 5 3, all balls, + 0 7 7 5 3 1 2 3 by minus 0 1 9.

CAPCOM That's a good read back Jack. You clipped on the first of the burn attitude. Confirm that was 1 5 3, over.

SPACECRAFT That's affirm, 1 5 3.

CAPCOM Good read back. And Jack, there's no OMS propellent pad because the gauges are unreliable we're using the delta V on the cue card.

SPACECRAFT Okay. And you got anything else for us on this pass Steve?

CAPCOM Nothing that I know of right now, Jack, we have 10 minutes to go.

SPACECRAFT Okay.

PAO This is Shuttle Control. CAPCOM Steve Nagel has been passing up information for the deorbit maneuver and for the entry and landing including winds. Informed the crew if the winds get out of limits at Northrup strip there is a possibility of a wave off but we do not expect that to happen. We expect to land on orbit 116. The deorbit maneuver will have a delta V of 286.2 feet per second. That's the change in the Columbia's velocity by that retrograde maneuver. The duration of the burn will be 2 minutes 38 seconds. And it's targeted at an apogee of 123 nautical miles and the perigee of -19 nautical miles. Visibility at Northrup strip reported good. Both OMS engines will be used for the deorbit maneuver and time of ignition will be 7 days 2 hours 34 minutes even.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT On page 5-27, looking at the panel MO13Q which shows that the AC utility power, correction the DC utility powe should be turned off but disregard, disregard I was reading it backwards there.

CAPCOM Okay.

SPACECRAFT Confirm it's on and it'll stay on till we hear th alarm. And Steve, I guess you know that the vacuum head valve the WCS fan was one we can't operate and I guess it's open. Somebody told me it was open the other day.

CAPCOM Roger, we copy that Jack.

SPACECRAFT Okay.

END OF TAPE

PAO This is Shuttle Control, Hawaii has loss of signal on Columbia's 114th orbit. Both crewmen suited up now. Acquisition through Buckhorn in 2 and 1/2 minutes. 6 days 23 hours 58 minutes, mission elapsed time, this is Shuttle Control Houston. This is Shuttle Control at 7 days mission elapsed time. Buckhorn will acquire Columbia in about 10 seconds.

CAPCOM Columbia, Houston through the States for 19 minutes, over.

SPACECRAFT Hello, Steve, got you through the States, we're having a little snack, and checking the switches on the middeck.

CAPCOM Roger, copy that. And during this pass we do have the PADs for you, when your ready.

SPACECRAFT Okay, stand by one. Okay Steve what kind of PAD d you want to talk about first?

CAPCOM Why don't we start with the DEL PAD if your ready.

SPACECRAFT Okay, go ahead with the DEL PAD Steve.

CAPCOM Roger, beginning with burn attitude, 153, 109, 333, 123, -019, delta V total, 286.2, 238 propellant is all balls. 200, 085, 085, 85, forward RCS delta V, 13, oxidizer 00, 1095.0, -0.2, read back.

SPACECRAFT Okay, I copy 153, 109, 333, 123, -019, 286.2, 238, all balls. 200, 085, 085, 85, 13, 2 balls 1095.0, -0.2.

CAPCOM That's a good read back Jack, and that's oxidizer to 0 on the forward RCS. Picking up EI -5 inertial attitude, 194, 317, 038. Right 000, EI-10, EI-05, 29.65, 03, 01, 54, 20, 360, a right hand turn to Northrup 17, winds as follows starting at 50,000. 240, 80, 250, 80, 240, 125, 230, 95, 235, 50, and or the surface, 200 at 10 to 22 knots, over.

SPACECRAFT Okay, we copy. 194, 317, 038, right 3 balls, 100[illegible] 29.65, 03, 01, 54, 20, 360, right hand turn to Northrup 17, got your winds, the big winds is at 30,000 ft, surface is 200 10 to 22.

CAPCOM That's a good read back Jack, and these winds from 35 down were STA measured by John about 1/2 hour ago. The weather is clear and good visibility at Northrup. The forecast winds on the surface are to pick up so we're going to have to watch those all the way to deorbit burn, and there is some probability of a wave off, if the winds go out of limit, but we don't anticipate that at this time.

SPACECRAFT Okay, I understand.

CAPCOM Jack, I'm ready for the maneuver PAD whenever you are.

SPACECRAFT Okay Steve, go ahead with the maneuver PAD.

CAPCOM Roger, OMS both, TV roll, 180 plus 0.1, -5.7, plus 5.7, 215492, TIG is 007, 02, 34, 00.0, 15509, -0.

END OF TAPE

PAO We've been informed then on this pass that becaus of winds at the landing site, we're anticipating a right turn into the runway instead of a left turn. We're 2 hours 56 minute away from deorbit. At 6 days 23 hours 37 minutes mission elapse time, this is Shuttle Control Houston.

CAPCOM NASA 946 Houston.

946 This is 946 reading you loud and clear Brewster.

CAPCOM Okay 946, I got you 5 by, and we're ready to copy

946 Okay, let me report the winds that we measured so far. This is, these are above ground level winds, and they are in true bearing, true bearing that measured off the inertial navigation system, at flight level 350 245 at 120. At 30,000, that's above ground level now, 240 at 125, 25,000, 240 at 108, a 20,000, 229 at 95, at 15,000, 229 at 82, at 10,000, 236 at 52 to 54 there we measured two sets of those, at 7,000, 228 to 240 and they're running 40 to 56 knots, at 2000, 212 28 ....

PAO This is Shuttle Control, that was a conversation between CAPCOM here in the mission control center Steve Nagal, and astronaut John Young, flying one of the shuttle training aircraft, NASA 946 and he's been shooting approaches at Northrup Strip, reported on winds, found some severe turbulance between 10,000 and 7,000 ft. however, he said he didn't think the orbite would notice that turbulence. We're 5 and 1/2 minutes away from Hawaii, at 6 days 23 hours 46 minutes, mission elapsed time, thi is Shuttle Control Houston.

SPACECRAFT Say what your winds are.

PAO This is Shuttle Control, Hawaii has acquired Columbia at 6 days 23 hours 51 minutes, mission elapsed time.

CAPCOM Columbia, Houston through Hawaii for 6 minutes, over.

SPACECRAFT Okay, got you loud and clear, I'm all suited up, and Jack is just getting his harness on.

CAPCOM Okay, copy that. The reason we had to call you going LOS at Orroral on the left OMS crossfeed bravo, was becaus we saw continuous drive closed on the valve with the switch in the closed position and going to GPC, fixed it, and we'll remain in GPC on that switch for the remainder of the flight Gordo.

SPACECRAFT Okay, it took 7 days, but it finally happened, huh?

CAPCOM Gordo, could you give us a read out on the talk back for that valve?

SPACECRAFT Yes, just a minute, I'll whip up there and look.

CAPCOM Gordo, there's no hurry on that, if you're downstairs.

SPACECRAFT Steve, it's so easy to float around, even in a suit that your not asking for anything. That talk back says closed, all 4 OMS cross feed valves show closed.

CAPCOM Thank you. Columbia, Houston, could you give us couple of words on how the RAD heat sink DTO went back about 31(

SPACECRAFT I'd better hold off until Jack gets on the headsets, cause he did it.

CAPCOM Roger. Columbia, Houston, we're 30 seconds LOS from Hawaii, next is Buckhorn in 3 and 1/2 minutes, over.

SPACECRAFT Okay Steve, I understand you wanted to know about the RAD heat sink DTO and it went just as advertised, no bells, no whistles, and just plain vanilla.

CAPCOM Good news Jack, we'll see you at the States.

SPACECRAFT Okay.

PAO This is Shuttle Control, Hawaii has loss of signa on Columbia's 114th orbit. Both crewmen suited up now. Acquisition through Buckhorn.....

END OF TAPE

= k i

PAO This is Shuttle Control at 6 days 23 hours 25 minutes mission elapsed time. Yarragadee is about to acquire Columbia.

CAPCOM Columbia Houston through Yarragadee for 6 minutes, over.

SPACECRAFT Okay, we're hearing you through Yarragadee. How d you hear me Steve?

CAPCOM Got you five by Jack.

SPACECRAFT Hello Houston, how do you read me through Yarragadee?

CAPCOM Columbia Houston, have you five by, over. Columbi Houston through Yarragadee for 5 minutes.

SPACECRAFT Okay, Houston, this is the Columbia. Read you lou and clear, how me?

CAPCOM Got you five by also Jack.

SPACECRAFT Okay the payload bay door closure was successful. We have cold soaked the radiators. We're about to maneuver to top sun and Gordo's getting suited up.

CAPCOM Sounds great Jack.

SPACECRAFT And how's the weather look and winds and so forth the runway selection at White Sands or is that premature at this point?

CAPCOM We're anticipating right turn to 17 but the winds are pretty gusty out of the south and we're checking it for you.

SPACECRAFT Alright, thank you.

CAPCOM Columbia Houston, do you remember the first point of contact for the door closure when you closed the payload bay doors, over.

SPACECRAFT Yea sure do. The first point of contact was going to be the same for all of the latches, however, the aft most latches were touching at that point first and it got progressively wider separation as we went forward to latch numbe 1. The point of contact was I would say at about 2.0 on the A t B scale.

CAPCOM We copy, thank you.

SPACECRAFT And latch number 16 touched first and latch numbe 1 last, but all at point number 2.0.

CAPCOM Copy that. Columbia Houston, Jack if you've got minute I'd like to discuss one thing on the flash EVAPs with yo

SPACECRAFT Go ahead.

CAPCOM Roger, if you would have trouble with primary A a got into the malfunction procedures and tried primary B you can expect some cycling of temperatures on primary B but we think i will control, so you'd want to ignore those notes in the pocket checklist that tell you to wait 30 seconds before proceeding pa the primary B and your indication of a failure on the primary B would be another EVAP out temperature message, over.

SPACECRAFT Okay, understand it's going to oscillate somewhat but it's not going to be considered fail until it goes above 60 degrees and gives an EVAP out temp message, right?

CAPCOM That's right, Jack, the temp is 65 degrees.

SPACECRAFT Alright, thank you. And we are maneuvering Houston.

CAPCOM We copy that, about 30 seconds LOS and then we'll pick you up at Orroral in a couple of minutes here Jack.

SPACECRAFT Okay.

CAPCOM Columbia Houston through Orroral Valley for 1 minute, over.

SPACECRAFT Okay, loud and clear Steve.

CAPCOM Roger. Columbia Houston, we're now 30 seconds LO from Orroral. Next is Hawaii in 16 minutes.

SPACECRAFT Alright we'll see you at Hawaii. No music today Hawaii.

CAPCOM Columbia Houston, we need the left OMS crossfeed bravo to GPC, over.

SPACECRAFT Alright, left OMS crossfeed bravo GPC. You got i

CAPCOM Okay, thank you Jack, we'll see you in Hawaii.

SPACECRAFT Yes sir.

PAO This is Shuttle Control. Orroral has loss of signal. Columbia's next acquistion is through Hawaii in 14 and

1/2 minutes. The payload bay doors have been closed successfully. And Columbia is preparing to maneuver to top sun attitude and the crew will start donning pressure suits. We've informed them during this pass that because of winds were at the landing site we're anticipating a right turn into the runway instead of a left turn. We're 2 hours 56 minutes away from deorbit. At

END OF TAPE

CAPCOM Roger.

CAPCOM Columbia, Houston 30 seconds LOS, next is Yarragadee in 29 minutes.

SPACECRAFT Ok, we'll see ya at Yarragadee, we got the starboard door in the proximity of the closed position and beginning theodolite ops on the starboard centerline. And the way it looks is that all the...all the rollers are on the same trajectory although the ones most aft are touching first. And it's proportionally a left close as you come forward.

CAPCOM Copy, thank you. See you at Yarragadee.

PAO This is Shuttle Control, Dakar has loss of signal crew conducting theodolite operations with the doors. Next acquisition is at Yarragadee in 27 and a half minutes. At 6 day 22 hours 58 minutes mission elapsed time, this is Shuttle Contro Houston.

PAO This is Shuttle Control at 6 days 23 hours 25 minutes mission elapsed time. Yarragadee is about to acquire Columbia.

CAPCOM Columbia, Houston through Yarragadee for 6 minutes, over.

SPACECRAFT Ok, we're hearing you through Yarragadee, how do you hear me, Steve?

END OF TAPE

CAPCOM for conducting future research in science, applications, and technology in space.

SPACECRAFT Well thank you Brewster, and our thanks to those in the control center there for all the effort that they went to to make this work, we worked with the people in the OSS for many months and we appreciate your cooperation and willingness to support the preparations for this flight and we're glad that it came out as well as it did, and we look forward to finding out what we learned and we'd both like a full report on the results, thanks.

CAPCOM Roger.

SPACECRAFT And on that subject Brewster, the last command entry to turn off the OSS was at 6 flag 2218.

CAPCOM Copy that Jack, thank you.

SPACECRAFT Ok, we standby ready to close the port door want to wait till exactly 347.

CAPCOM Copy, and we're ready.

SPACECRAFT Ok, we got the port door closed, no problem, we got the forward closed microswitch but not the aft.

CAPCOM Roger Gordo, that's what we see here as well.

CAPCOM We're 40 seconds LOS, we think it's ok to go ahea and proceed, and we'll see you next in Dakar in 5 minutes.

SPACECRAFT Ok, Brewster see you then, we'll proceed.

CAPCOM Roger.

PAO This is Shuttle Control, as we have loss of signa at Bermuda the port payload bay door is closed, and during this pass the crew received a message of appreciation for their work with the experiments from the folks responsible for the payloads. Next station is Dakar in 4 minutes 45 seconds. We'r 3 hours 47 minutes away from deorbit. At 6 days 22 hours 46 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 6 days 22 hours 51 minutes mission elapsed time. Dakar is acquiring Columbia now.

CAPCOM Columbia, Houston through Dakar for 6 minutes, over.

SPACECRAFT Ok, we have you in Dakar and we're doing theodolite ops on the fore center ramp.

CAPCOM Columbia, Houston through Buckhorn for 17 minutes, over.

SPACECRAFT Alright, we got you loud and clear. One thing to report. I doubt that it's too significant, but when we had wate loop pump 1 on it had 59 PSI pump outlet pressure. The book say 61 to 69.

CAPCOM Copy.

SPACECRAFT We held up on doing bubble 1 here on page 325. I ready to do it now with RMS radiant steps.

CAPCOM We're ready Gordo, go ahead.

SPACECRAFT RMS power's coming off. Back in primary. Okay, we're waiting the 15 seconds before RMS select off. Okay, Brewster, doing the right hand step's. You ready to go ahead ar deactivate the heater and so forth as printed?

CAPCOM Roger Gordo, you're go for that. Looks good.

SPACECRAFT Okay.

SPACECRAFT And Brewster, I take it the fuel cell purge we did earlier is adequate and one downstream is not required.

CAPCOM That's correct Jack.

SPACECRAFT Alright. Okay, we're going on interchanger for yo so you can watch us Houston.

CAPCOM Roger.

SPACECRAFT Okay, looks like we've got increased freon flow ir both loops, however, it doesn't look like it's steady as I had been led it would be.

CAPCOM We're looking Jack. Jack, it looks good down here

SPACECRAFT Okay, good. Houston, I checked the payload primar main B talk back and it says off instead of on.

CAPCOM Copy, standby 1. Gordo, we show that that should be on and it looks like it is drawing power. It indicates on to us.

SPACECRAFT The talkback is definitely off. Maybe I can tap o it a little here.

CAPCOM Roger, we think perhaps it's a talkback and you ca continue on. It looks like it's on to us.

SPACECRAFT Okay, I hit it a little bit but it didn't budge it.

CAPCOM Roger.

SPACECRAFT Cycle the switch on if you like.

CAPCOM Gordo, we think it's on and we don't want you to cycle the switch.

SPACECRAFT Okay. Maybe somebody light penned it on, huh?

CAPCOM Columbia, Houston, we're still seeing a bit of flo into the cabin. Do you recall closing the 14.5 cabin regulator inlets?

SPACECRAFT I recall closing them, Jack's down there I'll make another check. I can verify both 14.7 cabin reg inlets are closed.

CAPCOM Roger, thank you.

SPACECRAFT Yes sir.

CAPCOM Columbia, Houston, don't interrupt what you're doing. This is a no action for you. I just have a note that wa given to us. I'd like to pass along to you. And it reads as follows "with the OSS-1 and pallet deactivation payload operations would like to congratulate Jack and Gordo on an outstanding performance in conducting the STS-3 experiments over the last 7 days. Their efforts have shown the capability of the space transportation system to serve as an outstanding platform for conducting future

END OF TAPE

PAO At 6 days 21 hours 42 minutes mission elapsed tim this is Shuttle Control Houston. This is Shuttle Control at 6 days 21 hours 51 minutes mission elapsed time. Columbia coming up on acquisition through Yarragadee.

CAPCOM Columbia, Houston through Yarragadee for 6 minute over.

SPACECRAFT Okay, Yarragadee is very very weak again, Brewste

CAPCOM Copy that Jack, I don't have anything for you now.

SPACECRAFT Okay, that's probably good.

CAPCOM Yes sir.

CAPCOM Columbia, Houston 20 seconds LOS, Orroral Valley 2 minutes.

SPACECRAFT Okay, Brewster

PAO This is Shuttle Control, a short LOS here about a minute and a half between Yarragadee and Orroral, we'll stand b

CAPCOM Columbia, Houston through Orroral Valley for 4 minutes.

SPACECRAFT Alright, you're sounding loud and clear.

CAPCOM Roger, you are as well.

CAPCOM Columbia, Houston we have one change to your deorbit prep, that will occur on page 3-21 when your ready to copy.

SPACECRAFT Hold on one. Alright.

CAPCOM Roger Gordo, on page 3-21 in bubble 4 for the ARS water loop config at TIG-413, before the first step where you take the water pump loop 1 on and B, we need to have you go to panel L1, verify water loop 2 bypass mode manual, then do a manual decrease and set interchanger flow to 950 plus or minus 25, over.

SPACECRAFT Okay, I understand before we do bubble 4 there, w need to go to water loop 2 bypass manual and set its flow to 95 plus or minus 25.

CAPCOM That's a good read back Gordo.

SPACECRAFT Is there any reason not to do it right now?

CAPCOM Stand by one. Gordo, you can do it now if you like.

SPACECRAFT Okay.

CAPCOM And at your convenience we need a GNC spec 1 please, for a variable parameters.

SPACECRAFT Okay, just a moment. You got it.

CAPCOM Okay, we see it on CRT 2, thank you very much. Columbia, Houston 20 seconds LOS, CRT 2 is yours again, and we'l see you at Buckhorn in 24 minutes.

SPACECRAFT Okay, see you back in the USA.

PAO This is Shuttle Control. Columbia has lost signa with Orroral. Next station is Buckhorn in 23 minutes. The OSS experiments have been deactivated. And we expect the payload b door closing on schedule when we reach the United States. At 6 days 22 hours 5 minutes mission elapsed time, this is Shuttle Control Houston. This is Shuttle Contol at 6 days 22 hours 27 minutes mission elapsed time. Columbia will be acquired by Buckhorn in about 30 seconds.

END OF TAPE

PAO This is Shuttle Control, Columbia heading down nov across Africa toward the Indian Ocean station, acquisition there in 11 and a half minutes. At 6 days 21 hours 23 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 6 days 21 hours 34 minutes mission elapsed time. We're standing by to talk to Columbia's crew through the Indian Ocean station.

CAPCOM Columbia, Houston through Indian Ocean for 7 minutes, over.

SPACECRAFT Hello Brewster we're with you in Indian Ocean, we're about to stow the radiators.

CAPCOM Ok, sounds good.

SPACECRAFT Ok, I just activated the B water boilers controller, want to take a look at that.

CAPCOM We'll look at it.

SPACECRAFT Ok, if you like the looks of the water boiler, I'm bypass on the radiators.

CAPCOM Ok, sounds good Jack.

SPACECRAFT Ok, we got two to bypass, and the controller's off

CAPCOM Roger.

SPACECRAFT Notice the temps going up on the freon loop.

CAPCOM Copy.

SPACECRAFT Ok, got to 60 and I'm coming back down.

CAPCOM Columbia Houston we see the temperature not settling out we'd like you to go back to primary A.

SPACECRAFT Primary A, right.

SPACECRAFT Ok, Pri A on and Pri A off.

CAPCOM Thank you.

SPACECRAFT Ok, just cycled to primary A. We ended that about (garble). Ok, and looks like that might be some of our problem.

CAPCOM Ok, Jack we're looking at it.

SPACECRAFT Houston, Columbia we'll run over our status report

CAPCOM Say again Gordo.

SPACECRAFT I just want to summarize with what we got, we got everything closed up downstairs, bubble three is complete. I'm all suited up, up to jumping in the suit. I got my G-suit, sutures, and all that on, Jack has not quite got that far. Generally it's up and ready to go, and we're standing by here fc GO for doors.

CAPCOM Ok, Gordo copy all that, thank you.

SPACECRAFT I'm about two thirds of the way through my gatorade.

CAPCOM Copy.

CAPCOM Columbia, Houston we're 30 seconds LOS, Yarragadee is next in 10 minutes, configuration looks good to us, and you are GO to close the doors at the scheduled time, over.

SPACECRAFT Ok, we're GO to close the doors on time, thank you

CAPCOM Roger.

PAO This is Shuttle Control, Columbia out of range at the Indian Ocean station heading toward Yarragadee, acquisition there in 9 minutes 20 seconds. The radiators have been stowed, and the payload bay doors are scheduled to be closed on the next pass over the United States in about 45 minutes from now. At 6 days 21 hours, 42 minutes.....

END OF TAPE

SPACECRAFT Okay at the bottom for manuever to top sun. seven days zero zero three five zero zero.

CAPCOM Jack I made a mistake there, I'm sorry. That one went at the top of the page 3-33 for the IMU attitude.

SPACECRAFT Okay, for manuever to IMU attitude. That's seven slash zero zero three five zero zero.

CAPCOM That's a good read back and then the bottom for th top sun attitude is 7 days 0 hours 59, five niner minutes, over.

SPACECRAFT Okay, top sun attitude 7 days zero zero five niner zero zero thank you, Steve. Any more?

CAPCOM No that's it on the time updates and the only othe change is on the deorbit burn cue cards when you have those out.

SPACECRAFT Okay, I've got the deorbit burn cue cards, go ahea Steve.

CAPCOM Roger, this applies both to the two engine and one engine. Should be right on the back of the same card. You'll see two-thirds of the way down the card the line that says forward RCS delta V with blanks and then total aft quantity equa four zero percent.

SPACECRAFT I got it.

CAPCOM Roger, cross out four zero percent and insert 100 percent, one zero zero, that'll protect 1600 pounds approximatel aft RCS for the entry. You'll still have the full downmoding capability for an OMS propellant failure, over.

SPACECRAFT Okay, on that line I'll put 100 percent instead of forty.

CAPCOM That's affirm on both sides of the card. For the one engine or two engine deorbit burn Jack.

SPACECRAFT Okay, I'll make it both sides, thanks.

CAPCOM That's all we have.

SPACECRAFT You guys are getting easy.

CAPCOM Columbia Houston, we're about 1 minute LOS. We do not see the TACAN's powered up. At your convenience all three TACAN's to T slash R please.

SPACECRAFT Okay, I've got them at TR auto. Sixty nine (garble).

CAPCOM Sounds good. Columbia, we're 30 seconds LOS now. Next is Madrid in 6 minutes.

SPACECRAFT See you at Madrid, Steve.

PAO This is Shuttle Control. Bermuda has loss of signal. Next station to see Columbia will be Madrid in 5 minutes. During the pass over the U.S. we had television from both of the cameras mounted on the forward bulkhead of the payload bay in an attempt to observe and get more data on the particles being emitted from Columbia. 5 hours 21 minutes away from deorbit. At 6 days 21 hours 12 minutes mission elapsed ti this is Shuttle Control, Houston. This is Shuttle Control at 6 days 21 hours 16 minutes mission elapsed time. Columbia is approaching acquisition at Madrid on its 112th orbit.

CAPCOM Columbia Houston through Madrid for 5 minutes, over.

SPACECRAFT Good morning Brewster, how are you today?

CAPCOM Just fine Jack. And Steve's busy doing a lot of coordination with the folks out at Northrup to make sure that everything's squared away there, so I'll talk to you here for a few passes.

SPACECRAFT Alright, what can we do for you Brewster?

CAPCOM Jack, I have only one thing on panel C3. The DFI PCM recorder to high sample please.

SPACECRAFT Alright, PCM to high sample.

CAPCOM Thank you sir.

SPACECRAFT I guess that was on the STS checkout test which w deleted right, wasn't it?

CAPCOM Roger. Columbia Houston, 20 seconds LOS. Indian Ocean is next in 12 minutes.

SPACECRAFT See you at 12 Brewster.

CAPCOM Yes sir.

END OF TAPE

CAPCOM Columbia Houston. We're 30 seconds LOS. Next is MILA in 30 minutes and we are starting voice record again. Over

SPACECRAFT Okay. See you then.

PAO This is Shuttle Control. Columbia out of range a Orroral now, heading up over the Pacific Ocean. Next acquisitio in 25 minutes through White Sands, followed shortly by Merritt Island acquisition. We'll have television of (garble) ground commanded television at Merritt Island of the Shuttle induced atmosphere experiment. Observation of that experiment. Ignitio to clock has started here in the Control Center. Counting down to the deorbit burn. It shows 6 hours, 1 minute, 25 seconds to the deorbit maneuver at 6 days, 20 hours, 32 minutes mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 6 days, 20 hours, 56 minutes mission elapsed time. White Sands should have acquisition of Columbia in about 30 seconds and we'll have Merritt Island and Bermuda after that. Television coming up at Merritt Island of the observation of the Shuttle induced atmosphere experiment. We'll stand by.

CAPCOM Columbia Houston through the States for 12 minutes. Over.

SPACECRAFT Okay. We hear you through the States Steve. How me?

CAPCOM Got you 5 by, Jack.

CAPCOM Jack, we've got one switch on R-11 for you if you have time.

SPACECRAFT Okay. I'll be ready in just a second. I've got an armload of books here I'm putting somewhere.

CAPCOM No hurry. We've got 12 minutes in this pass.

PAO This is Shuttle Control. The...

SPACECRAFT Okay Steve, I'm at R-11. Go ahead please.

PAO Television is using 2 cameras...

CAPCOM Okay Jack, on R-11 row echo, wideband mission power off, O F F. Over.

SPACECRAFT Okay. Wideband mission power's off. Mark. Anything else?

CAPCOM No nothing else. The reason for that is we had a power bite a couple of days ago and they're postulating that recorder may run hot so we'll turn it off until before seat ingress and remind you to get it back on.

SPACECRAFT Okay.

PAO We should be getting television again from Mila shortly, we've been in a keyhold using 2 cameras and a split screen technique to monitor the particles that come out of the aft portion of the payload bay.

CAPCOM Columbia Houston. I do have a couple of other things. Some updates to MET's for maneuvers that happen quite a bit later on and also a minor modification to your deorbit burn cue cards. They're not time critical. We can get them at your convenience.

SPACECRAFT Okay. Be with you in a jiffy on that one.

CAPCOM Roger.

SPACECRAFT With all this stowage business, Steve, it seems t me like we're bringing back more than we came up here with. Could that possible?

CAPCOM You never know.

SPACECRAFT All right. I'm looking good here. Go ahead.

CAPCOM Okay. Jack. The first is on page 3-27.

SPACECRAFT Go ahead.

CAPCOM Roger. At the bottom of 327 for the MET, 6 days, 23 hours, 32 minutes. Over.

SPACECRAFT Okay. For maneuver to top sun, 6/23/32000, 2332.

CAPCOM That's a good read back. Next is on page 3-33.

SPACECRAFT Go ahead.

CAPCOM Roger. At the bottom of the page for the top sun attitude, 7 days, 0 hours, 35 minutes. Over.

SPACECRAFT ...

END OF TAPE

CAPCOM Columbia Houston, through Yarragadee for 4 and a half minutes, over.

SPACECRAFT Okay, we hear you Yarragadee, from Houston, go ahead.

CAPCOM Okay, Jack, was that the first time you heard us?

SPACECRAFT Yes sir.

CAPCOM Okay, got you five by now. What I was trying to relate to you at IOS is that at Orroral we will be taking commar of the television systems, so that over MILA we can do some work with it, looking at the SIA. There's no action required on your part.

SPACECRAFT Okay, you got it.

CAPCOM And Jack, we're getting into the PDP now. I do have a CRT timer update for you as well as a minor change on pag 3-9 of the deorbit prep.

SPACECRAFT Okay, let me go take a look just a second, standby

CAPCOM Roger.

SPACECRAFT Okay, give us a page number, Steve. We both hear that deorbit prep.

CAPCOM Okay Jack, number 1 on 3-7 is the CRT timer update when you're ready.

SPACECRAFT Go ahead Steve.

CAPCOM Roger. Item 17, + 02 + 34 + 00, over.

SPACECRAFT Okay, Item 7, 02, 34, 00

CAPCOM That's a good readback. And the next change is or page 3-niner.

SPACECRAFT Okay, 3 9, go ahead.

CAPCOM Roger, at the top of the page for the auto maneuve to tail to sun, before you execute that maneuver, change DAP alpha, vernier discrete rate to 0.4, over.

SPACECRAFT Okay, that's change DAP A to vernier 8, that'd be item 3 to 0.4 before maneuvering, is that affirm?

CAPCOM Roger, we'll double check that item number for you. And also, I do have some METs of maneuvers if you want to

copy those now. And Columbia Houston, for your information, tha item number was correct for changing the DAP. And I do have som METs for maneuvers one of which is that auto maneuver, tail to sun, if you want them.

SPACECRAFT Okay, standby. That was DAP A to 0.4 for atom 3, vernier discrete rate, right?

CAPCOM That is affirmative, Jack.

SPACECRAFT Okay, go ahead with your next one.

CAPCOM Okay, on that same page, for the auto maneuver tai to sun. The MET for that maneuver is 6 days, 20 hours, 40 minutes, over. And Columbia, Houston, we're 30 seconds LOS, did you copy that MET Jack?

SPACECRAFT Negative, and we're going to copy it at the next station, it keeps fading out. We don't have time to wait.

CAPCOM Sounds good, we'll pick you up at Orroral in 2 minutes.

SPACECRAFT Okay, Steve, see you at Orroral.

CAPCOM Columbia, Houston, through Orroral Valley for 4 minutes, over.

SPACECRAFT Got you loud and clear.

CAPCOM Got you five by also, Gordo. And Columbia Houston if you do have the time, I can finish up those changes on 3-9 an 3-8.

SPACECRAFT Hold on one second please.

CAPCOM You bet.

SPACECRAFT Okay Steve, go ahead and dictate.

CAPCOM Okay, Gordo, on page 3-9, we just have the MET for the maneuver to tail to sun. It is 6 days, 20 hours, and 40 minutes, four zero minutes, over.

SPACECRAFT Okay, 6 days, 20, 40.

CAPCOM That's a good readback. And on page 3-8, just above it. On the display entry configuration under the TACAN block, since we're not goint to OPS 8 we don't need to look for ground stations. You can set the antennae selects all to auto, and the channel thumb wheels all to 06 niner xray.

SPACECRAFT Okay, we'll do that.

CAPCOM And that's all we have now I can pass you the othe
METs later in the deorbit prep.

SPACECRAFT Okay, let's do that.

END OF TAPE

CAPCOM Gordo, everything looks perfectly nominal to us.

SPACECRAFT Check the sign of a neat housekeeper.

CAPCOM Roger. Columbia Houston, we're 25 seconds LOS. Next is IOS in 12 minutes.

SPACECRAFT Okay Steve.

PAO This is Shuttle Control. Madrid has loss of signal. The crew is still in their breakfast period. Columbia' next tracking station is the Indian Ocean station in eleven and half minutes. At 6 days 19 hours 50 minutes, mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control, at 6 days 20 hours missic elapsed time. Columbia will lock on to the Indian Ocean statior in about 30 seconds.

CAPCOM Columbia Houston through IOS, for six and a half minutes. Over.

SPACECRAFT That's fair, Steve.

CAPCOM Roger. And Columbia Houston for information only. At the Orroral pass we'll be taking command of the television cameras so we can use them over the next Mila pass tc do some observations for the SIA. No action required on your part.

SPACECRAFT (garble)

CAPCOM Roger Gordo, information only. At Orroral we will be taking command of the television system and over Mila we'll b doing some looking for the SIA folks and there's no action required on your part.

SPACECRAFT Houston, Columbia.

CAPCOM Roger go ahead. Columbia Houston, go ahead.

SPACECRAFT Okay. I'm hearing you better now and I think we just had a wireless battery failure. I changed it and heard yot say something about no action required.

CAPCOM Okay Gordo, I was just saying that over Orroral, w will take command of the TV system and then over the next Mila pass, we'll be doing some looking in the bay for the SIA folks. There is no action required on your part. This is info only. Over.

SPACECRAFT Steve, I guess its not my wireless, you broke up again but say it again next pass I guess.

CAPCOM Okay, I'll pass it at Yarragadee. Columbia Houst we're 30 seconds LOS now, next is Yarragadee in nine minutes.

PAO This is Shuttle Control. Columbia is moved out o range of the Indian Ocean station, heading toward Yarragadee. Acquisition there in 7 minutes 50 seconds. At 6 days 20 hours minutes mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 6 days 20 hours 16 minutes. Columbia approaching acquisition through Yarragadee.

CAPCOM Columbia Houston through Yarragadee for seven minutes. Over.

CAPCOM Columbia Houston through Yaragadee for seven minutes. Over.

CAPCOM Columbia Houston through Yaragadee for six and a half minutes. Over.

CAPCOM Columbia Houston through Yaragadee for six minutes. Over.

CAPCOM Columbia Houston through Yaragadee for five minutes. Over.

END OF TAPE

SPACECRAFT plus .11, minus .09, IMU 2 +.01, +.19, +.09, IMU +.21, +.12, -.28,

CAPCOM We copy, thank you.

SPACECRAFT Okay, and you don't have any objection if we maneuver back to PTC attitude now that we've got this done do you?

CAPCOM No objection, Jack. Jack did you copy, you can maneuver back to PTC.

SPACECRAFT Okay, we'll get back at the PTC and set up the rotation so we can go back to doing other things then, thank yo

CAPCOM Columbia Houston, reference that PTC maneuver, we do want you to initiate rotation on time at 1930 as called in t CAP, over.

SPACECRAFT Okay, we'll do it as is. Yes, I recall we're trying to optimize the field and so forth, aren't we?

CAPCOM That's affirm. Columbia Houston, we're 30 second LOS, next is MILA in 30 minutes.

SPACECRAFT Okay, we'll see you in a half an hour, Steve.

CAPCOM Roger.

PAO This is Shuttle Control. Columbia is out of rang at Auroral, next acquisition through Merritt Island in 30 minutes. Columbia is orbit now 132.7 by 121.2 nautical miles. With an orbital period of 1 hour, 29 minutes, 15 seconds. At 6 days, 18 hours, 57 minutes, mission elapsed time, this is Shutt Control, Houston.

PAO This is Shuttle Control at 6 days, 19 hours, 26 minutes, mission elapsed time. Columbia is on orbit number 111 and approaching acquisition through the Merritt Island, Florida tracking station.

CAPCOM Columbia Houston, through MILA for 11 minutes, over.

SPACECRAFT Okay at Mila, we already got our teleprinter work done and we're eating breakfast.

CAPCOM Very good.

SPACECRAFT Check the maneuver and the rotation that's typed there, would you Steve.

CAPCOM Wilco. Looks good Jack.

SPACECRAFT Okay, thank you.

WHITE SANDS Houston, White Sands, air to ground one.

CAPCOM Roger, White Sands, you're loud and clear on the air/ground 1, how me?

WHITE SANDS Oh, you're very loud and clear too.

CAPCOM Okay, I'll meet you around number 2.

WHITE SANDS Roger.

CAPCOM Columbia Houston, we're 30 seconds LOS, next is Madrid in six minutes.

SPACECRAFT Okay, Steve, see you at Madrid.

CAPCOM Roger.

PAO This is Shuttle Control. Madrid has loss of signal, or Bermuda has loss of signal. Madrid is the next station in 5 minutes, 10 seconds. At 6 days, 19 hours, 38 minutes, this is Shuttle Control Houston.

PAO This is Shuttle Control at 6 days, 19 hours, 43 minutes, mission elapsed time. Madrid has acquisition of signa with Columbia.

CAPCOM Columbia, Houston through Madrid for 6 minutes, over.

SPACECRAFT Okay, Steve, got you loud and clear.

CAPCOM Roger.

SPACECRAFT We're just sitting here finishing our breakfast. It just occurred to me, that after (garble) it might be a bunch of stuff in the cabin fan filters, so there's really no reason suspect anything is unnecessary or anything. Can you see anything on some delta P that would indicate that they wouldn't read down there?

CAPCOM Standby. Gordo, everything looks perfectly nomin to us.

SPACECRAFT Check the sign and relief nose keepers.

CAPCOM Roger.

END OF TAPE

SPACECRAFT There will be minimum fuel.

CAPCOM Copy.

SPACECRAFT Okay Steve let me give you some PGU readings whil I'm at it. You ready to copy?

CAPCOM We're ready. Go ahead.

SPACECRAFT Okay, (garble) are all okay. The time is right n 18:12, chamber seven 24.4, chamber eight 24.5, niner 24.5, 10 i 24.6, 11 is 24.7 and 12 is 24.9. Over.

CAPCOM We copy Jack. Thank you. And Columbia Houston I do have one thing for you in the cap, if its handy if not I'll get it in the next pass.

SPACECRAFT I've got it. Go ahead, shoot.

CAPCOM Okay Gordon, on page 4-133 about half way down th page is auto maneuver PTC, a correction to the attitude is in roll only, new attitude is 100.0, one hundred. The other two are, remain 187.4 and 86.8 over.

SPACECRAFT Okay. Understand change roll a hundred degrees.

CAPCOM That's affirm. And we are not recording voice at the present time and will not be until Orroral on orbit 111 whi is a couple of hours away. We'll advise you.

SPACECRAFT Okay. I don't have anything profound to say anyway.

CAPCOM And Columbia Houston, we're 15 seconds LOS now, next is Yarragadee in 27 minutes.

SPACECRAFT Okay. See you then.

PAO This is Shuttle Control. Madrid has lost of signal. Next acquisition through Yarragadee in 26 and a half minutes. At 6 days 18 hours 16 minutes, mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control. The change of shift new conference with flight director Tommy Holloway is scheduled for 4:30 a.m. central standard time in the JSC news center. 4:30 a.m. central time for the change of shift briefing with flight director Tom Holloway.

PAO This is Shuttle Control. The entry team led by flight director Harold Draughon is now on duty in the mission control center. CAPCOM are Steve Neigel and Brewter Shaw.

PAO This is Shuttle Control, at 6 days 18 hours 42 minutes mission elapsed time. Standing by for acquisition through Yarragadee.

CAPCOM Columbia Houston through Yarragadee for seven minutes. Over.

SPACECRAFT Okay we're here at Yarragadee, Steve. Go ahead.

CAPCOM Got you five by and have nothing for you at this time.

SPACECRAFT Okay. We're making breakfast and got a little lunch put together.

CAPCOM Okay sounds good.

SPACECRAFT A picnic lunch.

CAPCOM Columbia Houston 45 seconds LOS, next is Orroral i about 2 minutes.

SPACECRAFT Okay Orroral in 2, and we didn't have your alignment, we've clocked them at 18:48:30.

CAPCOM Okay 18:48:30.

PAO This is Shuttle Control. Yarragadee has lost of signal, Orroral will pick up Columbia in about 10 seconds. We'l stand by.

CAPCOM Columbia Houston through Orroral Valley for five minutes. Over.

SPACECRAFT Okay we've got you in Orroral.

CAPCOM Jack if you've got time, could you give us the IMU touquing angles, please.

SPACECRAFT Yes I've got time, Steve. IMU 1 plus point zero niner (garble) plus point 11, minus .09. IMU 2 plus point...

END OF TAPE

PAO This is Shuttle Control, 6 days 17 hours 58 minutes mission elapsed time. Bermuda has acquired Columbia and we expect wakeup call at this station. We'll stand by.

wake up music.

CAPCOM Good morning Columbia.

CAPCOM Columbia Houston through Bermuda for 2 minutes. Over.

SPACECRAFT Okay that's good music, Houston, we're reading you loud and clear. How we?

CAPCOM Got you five by. Good morning.

SPACECRAFT Good morning. Are you ready?

CAPCOM We're ready if you are.

SPACECRAFT Yeah, we're ready.

SPACECRAFT What's new this morning?

CAPCOM Oh not much. Northrup's weather is going to be okay. You'll have some gusty winds out of the south, but we'll get you more detail on that.

SPACECRAFT Okay, fair enough.

CAPCOM Columbia Houston. We're 30 seconds LOS from Bermuda. Next is Madrid in 7 minutes.

SPACECRAFT Okay. We'll see you in seven.

PAO This is Shuttle Control. Columbia's moved out over the mid-Atlantic now, out of range at Bermuda. Wakeup at this station was "Eight days on the road and I'm going to Make it Home Tonight" by Dave Dudley. The crew reports they're ready to come home today. Next station is Madrid in 6 minutes, with 6 days, 18 hours, 3 minutes mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 6 days, 18 hours, 9 minutes mission elapsed time. Columbia is 30 seconds away from acquisition through Madrid.

CAPCOM Columbia Houston through Madrid for 5 minutes. Over.

SPACECRAFT Okay. We read you loud and clear. We just got the morning newspaper and are reading it over. I've got the window

shades down and will be out here momentarily.

CAPCOM Okay we'll give you some time to read it. I've got two things which are going to make life a little easier instead of harder for you. There is no water dump required this morning and there is no SM checkpoint required. Over.

SPACECRAFT Okay, no SM checkpoint and no water dump. Thank you Steve. Okay we've got a question.

CAPCOM Go ahead.

SPACECRAFT Why would they want the range times at Northrup by today?

CAPCOM We'll try to get some air space for you.

SPACECRAFT Steve, you might get a pipeline cloud here. They get release time clearance.

CAPCOM Okay. We'll take care of that coordination.

SPACECRAFT (garble)

CAPCOM Want an enroute penetration or do you want to hold?

SPACECRAFT I don't know if they made any clearance for the penetration or ride along with the fence.

CAPCOM Roger.

SPACECRAFT We'll be minimum fuel.

CAPCOM Copy.

SPACECRAFT Okay Steve let me give you some PGU readings while I'm at it. Are you ready to copy.

CAPCOM We're ready. Go ahead.

SPACECRAFT Okay, unless there's no...

END OF TAPE

PAO Currently expecting the deorbit burn to begin at mission elapsed time 7 days, 2 hours, and 34 minutes with entry interface about 18 minutes later at 7 days, 2 hours, 56 minutes and the blackout period during which we're out of communication with the vehicle due to the ionization of the atmosphere around the spacecraft interfering with the radio transmission to run from 7 days, 2 hours, 59 minutes to 7 days, 3 hours, 14 minutes, some 15 minutes total time with the touchdown at 7 days, 3 hours, 27 minutes or about 1:27 p.m. Central Standard Time. Currently, the spacecraft is on orbit number 108 passing out over the South Pacific Ocean about 30 minutes away from its next pass of a ground station where data will be observed out of spacecraft systems that are operating. The ground controllers have continued to monitor the performance of the onboard systems and everything continues to work well aboard the Columbia. Six days, 16 hours, 3 minutes mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston. Six days, 17 hours, 1 minute mission elapsed time. Crew activity plans and teleprinter messages are all ready for the crew to begin their day today. Astronauts Jack Lousma and Gordon Fullerton have about 1 hour scheduled remaining in their scheduled sleep period. They're due to awake at about 4:00 a.m. Central Time. After they proceed through their routine post sleep activities, they'll be reviewing the teleprinter messages that have already been put onboard and will prepare and consume their breakfast and then they begin with all of the activities involved in getting the spacecraft ready for reentery later today, including fuel cell purge, stowing of all the flight data file documents, clearing up all the other things that maybe laying around the cabin and putting them where they go so they won't have anything floating around and getting in the way when they're coming back in; and scheduled to close the payload bay doors up at about mission elapsed time 6 days, 22-1/2 hours and that will occur on orbit number 113. The deorbit burn is scheduled to take place on orbit 115. That will be at 7 days, 2 hours, 34 minutes mission elapsed time. Columbia will begin the entry interface at about 18 minutes later and then will be in blackout about 3 minutes after that time for a duration of about 15 minutes and is scheduled to touch down on the dry lake bed at Northrup strip at 7 days, 3 hours, 27 minutes and 36 seconds according to figures we had earlier. There may be some slight changes to these, a matter of a minute or two, as updates are made and new calculations are put through the computers. Just a reminder that the flight control team change of shift briefing is currently scheduled for approximately 4:30 a.m. this morning Central Time. That will be in Room 135 of Building 2. At 6 days, 17 hours, 4 minutes mission elapsed time. This is Mission Control Houston.

CAPCOM This is Shuttle Control at 6 days, 17 hours, 58 minutes mission elapsed time. Bermuda has acquired Columbia and we expect a wakeup call at this station. We'll stand by.

CAPCOM (Wakeup music)

END OF TAPE

PAO And Columbia Houston get a brief snapshot of the functioning of the onboard systems each time Columbia passes within range of a ground station. All systems appear to be normal. And activity on the night shift here centers on the minor adjustments to the entry day crew activities. And preparing the usual teleprinter messages for the morning. The crew is scheduled to wake at 4:00 a.m. central time in just about 4 hours. And at that time they will begin fairly relaxed preparations for entry. Current schedule relating to the entry activity or entry events. At 7 days 2 hours 34 minutes and 57 seconds we'll be getting the deorbit burn with entry interface about 18 minutes later. And a blackout period beginning about 3 minutes after that and continuing for about 15 minutes. Touchdown on the dry lake bed on the Northrup strip, White Sands, New Mexico is scheduled for 7 days 3 hours and 27 minutes, mission elapsed time. That will be about 1:27 p.m. central standard time. At 6 days 14 hours 2 minutes, mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston, 6 days 15 hours mission elapsed time. Columbia is currently on orbit number 108 and is within range of the Dakar tracking station. All remains quite aboard the spaceshuttle at this hour. Astronauts Jack Lousma and Gordon Fullerton are scheduled to wake about 4:00 a.m. central time. And begin making final preparations for entry after a successful full duration of a seven day flight. Spacecraft continues its slow roll relative to the sun, know as the bar-b-que mode which helps to even out the temperatures across the orbiter. At about 7:00 a.m., the crew will begin buttoning up the vehicle, closing the payload bay doors, putting all the systems in the proper configuration. And storing all the loose equipment. Deorbit burn is scheduled to begin at about 12:34 p.m. central standard time. And touchdown out on the desert lake bed in New Mexico at Northrup strip is set for approximately 1:27 p.m. central time. Just a reminder that the next change of shift press conference for the off going flight control team, currently scheduled for 4:30 a.m. central time, room 135 of building 2. 6 days 15 hours 1 minutes, mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston, 6 days 16 hours, mission elapsed time. Columbia now out over the South Pacific Ocean. Flight controllers here in Mission Control have been reviewing the weather data for the time of landing out at the primary landing site at White Sands, New Mexico, later on today. It appears that the weather will be adequate to support an nominal landing. The crew has about 2 hours remaining in their sleep period. Will be waking up about 4:00 a.m. central time this morning. And will be settling in to get the vehicle properly configure for entry. Stowing all the loose material remaining, closing the payload bay doors about 7:00 a.m. Currently expecting the deorbit burn to begin at mission elapsed time 7

days 2 hours 34 minutes with entry interface about 18 minutes later at 7 days 2 hours 56 minutes.

END OF TAPE

PAO Mission Control Houston, 6 days 11 hours 55 minutes, mission elapsed time. During that recent pass over the Ascension Island tracking station data was relayed to the ground and engineers here in Mission Control had a chance to observe the functioning of the onboard spacecraft systems. During the course of that pass, flight director Tommy Holloway asked for a status check in mission control of the health of all the systems which appear to be functioning well at this time. We have just crossed the equator on the northern track of the orbit and have just begun orbit number 106. The crew has been in their sleep period for about 2 hours now. And it will be about another 32 minutes before we reacquire any data with the vehicle which will be over the Guam station. 6 days 11 hours 56 minutes, mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston, 6 days 13 hours mission elapsed time. Currently on orbit number 106 and about 5 minutes away from passing over the Santiago, Chile tracking station, where data coming down from the space craft will be observed by flight controllers here in Mission Control who continually check out and evaluate the health of the systems onboard the spacecraft during the night. The crew has about 5 hours remaining in their sleep period. The spacecraft remains in the passive thermal control mode or bar-b-q mode as it is referred to. Which it has a slow rotation while on orbit to equally all sections of the spacecraft and prepare it for entry tommorrow. Which is scheduled to occur at about 12:35 p.m. central standard time with the deorbit inition and touchdown in New Mexico about 1:27 central standard time. 6 days 13 hours 1 minute mission elapsed time. This is Mission Control Houston.

PAO This is Mission Control Houston, 6 days 14 hours mission elapsed time. Astronauts Jack Lousma and Gordon Fullerton are sleeping now aboard the spaceshuttle Columbia. Circling the Earth every hour and a half at an altitude of approximately 130 nautical miles. Spacecraft is on orbit number 107 and in about a minute and a half will pass within range of the Guam tracking station. And continue out over the Pacific. Ground controllers in Mission Control here in Houston get a brief snapshot of the functioning of the onboard systems each time Columbia passes within range of a ground station. All systems appear to be normal. And activity on the night shift here centers on the minor adjustments to the entry day crew activities. And preparing the usual teleprinter messages for the morning. The crew is scheduled to wake at 4:00 a.m. central time. Just in about 4 hours. And at that time they will begin fairly relaxed preparation for entry.

END OF TAPE

PAO Mission Control Houston, 6 days 11 hours 55 minutes, mission elapsed time. During that recent pass over the Ascension Island tracking station data was relayed to the ground and engineers here in Mission Control had a chance to observe the functioning of the onboard spacecraft systems. During the course of that pass, flight director Tommy Holloway asked for a status check in mission control of the health of all the systems which appear to be functioning well at this time. We have just crossed the equator on the northern track of the orbit and have just begun orbit number 106. The crew has been in their sleep period for about 2 hours now. And it will be about another 32 minutes before we reacquire any data with the vehicle which will be over the Guam station. 6 days 11 hours 56 minutes, mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston, 6 days 13 hours mission elapsed time. Currently on orbit number 106 and about 5 minutes away from passing over the Santiago, Chile tracking station, where data coming down from the space craft will be observed by flight controllers here in Mission Control who continually check out and evaluate the health of the systems onboard the spacecraft during the night. The crew has about 5 hours remaining in their sleep period. The spacecraft remains in the passive thermal control mode or bar-b-q mode as it is referred to. Which it has a slow rotation while on orbit to equally all sections of the spacecraft and prepare it for entry tommorrow. Which is scheduled to occur at about 12:35 p.m. central standard time with the deorbit inition and touchdown in New Mexico about 1:27 central standard time. 6 days 13 hours 1 minute mission elapsed time. This is Mission Control Houston.

PAO This is Mission Control Houston, 6 days 14 hours mission elapsed time. Astronauts Jack Lousma and Gordon Fullerton are sleeping now aboard the spaceshuttle Columbia. Circling the Earth every hour and a half at an altitude of approximately 130 nautical miles. Spacecraft is on orbit number 107 and in about a minute and a half will pass within range of the Guam tracking station. And continue out over the Pacific. Ground controllers in Mission Control here in Houston get a brief snapshot of the functioning of the onboard systems each time Columbia passes within range of a ground station. All systems appear to be normal. And activity on the night shift here centers on the minor adjustments to the entry day crew activities. And preparing the usual teleprinter messages for the morning. The crew is scheduled to wake at 4:00 a.m. central time. Just in about 4 hours. And at that time they will begin fairly relaxed preparation for entry.

END OF TAPE

CAPCOM We just wanted to tell you that we really enjoyed working with you. We think you did a super job, and we appreciate the opportunity to work on your flight.

SPACECRAFT The pleasure was ours, and I really mean it when w say we sure couldn't have done it without you.

CAPCOM Well, Gordo, I know that speaking for Pinky and myself, I don't think that any of us could have done it without the flight control team. They just did a great job here.

SPACECRAFT Well, I'll have to second what both of you said, and we'll just look forward to coming back and talking it all over with you and we (garble). And hoping we can learn somethin for future flights and one of these days you'll be on one of them.

CAPCOM Sure hope so.

SPACECRAFT Well, how long will it take Neil to debrief this one?

CAPCOM Wanted you to hear the laughter in the room, I thought I'd key the mike. And Columbia, rest assured the Ivory team is going to be coming on to relieve us. Know you haven't heard much from them yet, but they're not to bad. They're reasonably confident. And they wanted me to tell you to get a good sleep because they will.

SPACECRAFT Okay, well we're confident, but they're also nigh owls, I know that.

CAPCOM Oh, they will be watching, that's what they said.

SPACECRAFT I tell you, they put up super job in (garble) in the morning. All of you've done a real good job on that. I ha to compliment you on your messages, the contents, the form and forth.

CAPCOM Roger, that, Jack and goodnight. Get a good slee

SPACECRAFT Okay, Goodnight Sally, good team. By the way, I want all of you go straight home now.

PAO This is mission control, Houston. Final pass of the evening at Hawaii, as the crew is tucked in for the evening. Orbit 104, a little bit of light hearted manner betwe capcom Sally Ride, and the crew of Columbia. As Neil Hutchinson's team hands over to Tommy Holloway's team of flight

controllers, who will take the over night. Neil Hutchinson's change of shift briefing is forecast to take place at 8:30 central standard time in room 135, building 2. To repeat, it

will not be at 9:00 but 8:30. Next station in 17 minutes, Santiago. However, there's not likely to be any conversation with the crew as much as the sleep period begins in 19 minutes. At day 6, 9 hours, 39 minutes, mission elapsed time; mission control, Houston.

PAO This is mission control, Houston at day 6, 10 hours, 4 minutes. The change of shift briefing with the off going flight director Neil Hutchinson is scheduled at 8:30 central time in building 2, room 135. Earlier in the day this estimated time of the briefing was 9:00, but it has been moved, repeat has been moved to 8:30 central time. Mission control, Houston, day 6, 10 hours, 5 minutes.

PAO Mission control Houston, 6 days, 11 hours, 31 minutes, mission elapsed time. We'll be passing over the Santiago, Chile tracking station shortly and should be seeing some data come down at that time. Currently on orbit number 105 6 days, 11 hours, 31 minutes, mission elapsed time, this is mission control, Houston.

End of tape.

PAO This is Mission Control Houston. Loss of signal through Indian Ocean Station at the start of Columbia's 104th la around the Earth. Thirty minutes away from reacquisition throug Hawaii for the final live pass of the evening before the crew sleep period. Late in orbit 103, the private medical conference with the flight surgeon took place over the Botswana voice relay station. Dr. Sam Pool, JSC Director of Medical Operations, reports that the crew is in excellent shape, has asked for no further medications in several days, nor have any been prescribed. They're eating well and feeling well. Ready to con home, somewhat reluctantly and during this completed pass through, or over Indian Ocean station, they went through a rathe brief remote manipulator system troubleshooting procedure. However, the system has been stowed for the duration of the flight. This was just a engineering exercise to try to determin what the minor temperature variations are coming from. Twenty-eight minutes now until reacquisition through Hawaii, at which time Jack Lousma promises additional music. At 6 days, 9 hours, 2 minutes mission elapsed time. Mission Control Houston.

CAPCOM Columbia Houston through Hawaii for 7 minutes. Over.

SPACECRAFT Okay. We hear you through Hawaii Sally. We're sitting here eating our dinner and barbequeing away with the tir pressure on and IMU alignment all done and things are looking rosy here. How about down there?

CAPCOM Things are looking real good down here too Jack ar just for your information, we got all the IMU alignment data at Indian Ocean real time so we don't need any numbers from you.

SPACECRAFT Okay. That's good news and like I said, we're not going to play any music but we are drinking tropical punch.

CAPCOM Well, that's good news on the music Jack.

SPACECRAFT On the other hand, we might have something you haven't heard yet.

CAPCOM Roger Jack, and before you get a chance to play it let me keep talking. We'd like you to check your DAP, check to make sure that you've got a 1 degree deadband in the DAP. We se a .05 deadband.

SPACECRAFT Yeah, that one is but (garble) I don't know when I had a change but I will change it to 1 degree.

CAPCOM Okay. (garble)

SPACECRAFT That's vernier deadband right? Item 9.

CAPCOM That's affirm and that's DAP A-7.

CAPCOM And Jack, we're sending you a state vector this pass.

SPACECRAFT Okay.

CAPCOM And Columbia, we'd like to correct one small point on the teleprinter message that came up this morning. We had advised you on that that the BFC light would go out during the OPS 8 checkout. That's not right. It won't go off until the BF is brought up to run and gets the payload busses, so we expect that when you do the DPS reconfiguration tomorrow morning before entry, the BFC light will go out. It'll be working fine for you on entry.

SPACECRAFT Okay Sally.

CAPCOM Columbia Houston. We've looked over the orbiter configuration. It looks real good to us for sleep. Before you do go to sleep tonight, we'd like you to add to the presleep configuration a cycle of the star tracker shutters, just so that we can have those open and try and get some stars before you go to sleep.

SPACECRAFT Okay. I'll do that Sally. Thank you.

CAPCOM Okay.

CAPCOM And Columbia with 2 minutes left in the pass. Thi is going to be the last pass of the evening and it's also going to be the last pass for the Silver Team during the flight and we just wanted to tell you that we really enjoyed working with you. We think you did a super job and we appreciate the opportunity to work on your flight.

SPACECRAFT The pleasure was ours. I really mean it when I sa we sure couldn't have done it without you.

CAPCOM Well Gordo, I know that speaking for Pinky and myself...

END OF TAPE

CAPCOM More good news, thank you.

CAPCOM Columbia Houston through Indian Ocean, for 7 minutes, over. Columbia Houston through Indian Ocean for 7 minutes, over. Columbia Houson through Indian Ocean for 5 and a half minutes, over. Columbia Houston, how do you read? Columbi Houston, how do you read?

SPACECRAFT Okay, we're hearing you Sally, go ahead.

CAPCOM Okay, Jack, we're hearing you now. We've got 4 an a half minutes left in the pass. And I have just a couple payload notes for you.

SPACECRAFT Okay go ahead. I'll tell you first that we got a fuel cell purge working right now if you want to watch.

CAPCOM Roger, Gordo we see that, we saw fuel cell 1 purging and it looks good.

SPACECRAFT Okay.

CAPCOM Okay, and this is in regards to the OSS-1 tape recorder. We'd like you to change tape recorder 1 to track 1. And give us a monitor level reading.

SPACECRAFT Okay, OSS tape recorder 1, track slack 1 is readir bravo.

CAPCOM Copy, it's reading low.

SPACECRAFT That's negative, reading bravo, B as in bravo.

CAPCOM Roger, bravo, thank you.

SPACECRAFT Okay.

CAPCOM And Jack the other note is that we've got another PGU reading that's scheduled for 09:20 this evening. And we if possible would like to get those readings down, both the noon reading and this evening's reading before we go to bed tonight. And last pass will be Hawaii which is a good seven minute pass coming up next.

SPACECRAFT Okay, we just took them, Gordo will read them to you.

CAPCOM Okay go ahead.

SPACECRAFT Okay, Sally, here's day 6, at 02:25, that was noo 26.3, 26.3, 25.8, 25.8, 26.5, 27.4, and last status was on, everything was normal. The next one was day 6 at 08:25, that's

the lastest one, 27.0, 27.2, 27.0, 27.0, 27.4, 27.8, last status on, and still on, I'm looking through the little screen, that's it, over.

CAPCOM Roger Gordo, thank you, we copy.

SPACECRAFT And Sally, I don't see anymore getaway special OPS do you want me to secure the gas?

CAPCOM Jack, we think there's one scheduled for tomorrow morning, we'd like you to wait till then.

SPACECRAFT Okay, I'll wait, thank you.

CAPCOM Columbia Houston with a minute and a half left. I there's someone on the flight deck, we've got a quick RMS troubleshooting procedure we'd like you to run through.

SPACECRAFT I'm there, go ahead.

CAPCOM Okay, we'd like the RMS select switch to port.

SPACECRAFT Okay, it's in port and I got a singular, reach limit and master alarm.

CAPCOM Roger, we copy. And standby just a minute. And Columbia Houston, you can take the RMS select switch back to off now. And that will complete the troubleshooting for us, thank you.

SPACECRAFT Okay, it's off, thank you.

CAPCOM And we're 20 seconds to LOS, Hawaii is next at 09:30, and that's in 30 minutes.

SPACECRAFT Okay, we'll see you in 30 Sally.

CAPCOM Okay.

SPACECRAFT There will be no music.

CAPCOM Roger.

PAO This is mission control Houston. Loss of signal through Indian Ocean station at the start of Columbia's 104th l around the Earth. 30 minutes away from reacquisition through Hawaii for the final live pass of the evening before the crew sleep period

END OF TAPE

CAPCOM Okay. We think the problem was with one of the tw microswitches in the port latch gang there, and that although yo had single motor deploy time, we think you'll have dual motor stow time. We'd like you to verify that by restowing the radiators, both of them just per the nominal procedure. Relatch them. We think that that may free up that microswitch and then we'll be, assuming that we get dual motor stow time, we'd like you to redeploy them and then just sleep with the radiators deployed. We think there's no problem keeping them deployed as long as we've still got the dual motor stow time.

SPACECRAFT Okay. You want us to restow the radiators and if we get two motors stow time, you want us to restow the radiators and relatch them. If we get two motors stow time, then you want us to redeploy them and if we get only one motor stow time, leav the port one stowed I take it. Is that right?

CAPCOM That's correct.

SPACECRAFT Okay. We'll give it a whirl.

CAPCOM Roger. And we've got data now and could watch if now is a good time.

SPACECRAFT Okay Sally. I'm going to go to stow right now...3 2 1 mark. You're going to kind of have to watch them for us because it's dark out there and the lights haven't come up to speed yet.

CAPCOM Roger Gordo.

SPACECRAFT (garble) talkbacks.

SPACECRAFT Okay both of them stowed on two motor times.

CAPCOM Roger. We copy.

SPACECRAFT Okay. And now you do want to latch them. Right?

CAPCOM That's affirmative.

SPACECRAFT Going latch. Ready mark. Okay, we've got two motor latch time. We'll unlatch them.

CAPCOM Roger. We see that too Jack and you're go to do that.

SPACECRAFT Okay. Going, I'm going to release 3, 2, 1 mark. Okay. We've got two motor unlatch time and now you want us to deploy them. Correct?

CAPCOM That's affirmative and we see all the microswitches, so we think you'll get two motor time in the deploy also. And we've got (garble) with 30 seconds left in thi pass. We're going to run the MED conference in Botswana which i coming up at 8:45, and also you might cycle the star tracker shutters open and closed. Try and get some stars in there.

SPACECRAFT Okay.

CAPCOM Roger. And Jack, if you could dig out for us the time that you switched to primary A on the EVAP, we could get a playback and look at that data.

SPACECRAFT I've got it. Just a minute.

CAPCOM Okay. We'll get that over Botswana.

PAO This is Mission Control Houston. Loss of signal through Santiago. Fifteen minutes away from the private medical conference of Botswana voice relay station and in recycling the payload, recycling the space radiators again, apparently the balky microswitch was shaken loose to where it performed normall and we were getting the proper time for two motors driving the radiators from stowed to deployed position so now for the evenin the radiators will be deployed into their normal position. Unless part of the Botswana pass is handed back to the flight control team by the surgeon, the next station will be Hawaii in almost an hour, 59 minutes. No, I beg your pardon. Indian Ocea station in 22 minutes. At 6 days, 8 hours, 30 minutes. Mission Control Houston.

CAPCOM Columbia Houston. We're back with you. We've got 30 seconds left in this pass and Indian Ocean is next in 4 minutes.

SPACECRAFT Okay. We'll see you at Indian Ocean in 4 and the primary evaporator controller went to A at 7:48, 0748.

CAPCOM 0748. Thank you Jack.

SPACECRAFT And we got good two motor time on both radiator deploys.

CAPCOM More good news. Thank you.

CAPCOM Columbia Houston through Indian Ocean for 7 minutes. Over.

END OF TAPE

SPACECRAFT ...the only thing I can think of might be is one o those film affects on the breaker, something like that, over.

CAPCOM Roger, we copy that Gordo, and we'll look at the data.

SPACECRAFT Meanwhile, we understand you want us to leave them deployed, is that correct?

CAPCOM Standby. Columbia Houston, with 3 and a half minutes left in this pass, we're still looking at the data, and discussing what we want to do. But if we don't get you back, ge back to you by this pass, we think we'd like you to restow the port radiator. We'd prefer not to leave that out, if we've only got single motor.

SPACECRAFT Okay, you want to restow it alone, leave the starboard as is. We can pull appropriate breakers to do that, i that's what you mean?

CAPCOM That's affirmative, but stay where you are now, we'll give you a call at the end of this pass.

SPACECRAFT Alrighty. Okay, and I have a question about maneuvering, in my CAP it says at 7:52 initiate to maneuver at the IMU align attitude. And then I got another entry at page 50 to initiate a maneuver and I'm kind of wondering what I ought to be doing, I guess.

CAPCOM Standby. Columbia Houston, we think we'd like you to go back to top sun now. The maneuver should begin at 8:50.

SPACECRAFT Okay, I got a write in says 7:52 but you want to b in top sun now, huh?

CAPCOM Roger, we see that and we would like you to be in top sun now and start the IMU align at 8:50.

SPACECRAFT Okay.

CAPCOM Okay, and with one minute left, we'd like you to leave the radiators deployed as they are now, and we'll talk to you again at Santiago.

SPACECRAFT Okay.

CAPCOM And that's coming up in 20 minutes.

SPACECRAFT And I turned the (garble) evap off. I also notice that the B controller was controlled at 50 degrees. And so I went to the A controller, maybe there was a transient in there, but at any rate A the controllers are controlling at 40 degrees.

CAPCOM Okay, we copy you're on the A controller and it's working at 40.

SPACECRAFT That's affirm.

PAO This is mission control, Houston. Loss of signal through Hawaii, 19 minutes to Santiago, Chile station. During the redeployment of the space radiators, which are between the payload bay doors and the bulk of the payload bay itself and are deployed on separate hinges. Starboard door deployed in 37 seconds, but it took a minute and 18 seconds to get the port radiator out. Control center people, namely the ECOM, Charlie Dumas is looking at what this may, what significance this might have regards to the drive motor capability. Right now the plot is to leave the radiators where they are for the time being. Apparently the crew was a little bit early in going to an IMU alignment attitude that's due in about 54 minutes from now. So they were instructed to go back to the top sun attitude until th time called for in the flight plan for the IMU alignment attitude. 17 minutes away from Santiago, at day 6, 8 hours, 5 minutes, mission control Houston.

PAO This is mission control Houston, 30 seconds from acqusition through Santiago, Chile. The pass will last some 6 and a half minutes. Following pass through, or over Botswana voice relay station, will be devoted to the routine nightly private medical conference with the flight surgeon. We have AOS at this time through Santiago.

SPACECRAFT Hello Houston, we hear the teleprinter running.

CAPCOM Roger, Jack, we just acquired voice. How do you read?

SPACECRAFT Five square, how me?

CAPCOM The same. And Jack, the teleprinter that we're sending up is the entry weather, and we've got a story on the radiators.

SPACECRAFT Okay that's good, go ahead.

CAPCOM Okay, we think the problem was with one of the tw microswitches in the port latch gang there. And that although you had single motor deploy time, we think you'll have dual mot stow time. We'd like you to verify that by restowing the radiators, both of them just per the nominal procedures. Relat them, we think that that may free up that microswitch

End of tape.

CAPCOM Okay, now go ahead with the heater switches pleas Sally.

CAPCOM Okay, on panel A11, we'd like 02 and H2 tank 4 heaters alpha to off, OFF.

SPACECRAFT Alright, that's done.

CAPCOM Okay and on panel R1, we'd like the 02 and H2 tan 3 heaters alpha to auto.

SPACECRAFT Okay, that's H2 and 02 alpha heaters to auto on tank 3.

CAPCOM That's affirmative, and you may remember yesterda we configured to try and get tank 4 down to 10 percent, so we could do some testing with the low levels of cryo in the tank, but we're so fat on cryo that we can't get it down to 10 percen and we don't want you to going to sleep with heaters in that configuration.

SPACECRAFT Okay. And by the way, I want to compliment you folks on making sure we don't have any alarms at night, you've been really doing a super job of that.

CAPCOM We agree with that Jack, the people in the room have been doing a great job, and they intend to do it for one more night.

SPACECRAFT I'm for that, but I'm not going to play Blue Hawa because I'm afraid it'll spoil you.

CAPCOM Columbia, we're 30 seconds LOS, Indian Ocean's ne in 3 minutes.

SPACECRAFT Okay, we'll see you at IOS, Sally.

SPACECRAFT If you're still there, it looks like, just like t last closing, there's zero deflection trajectory on all latches and they'll all coming down at the same time.

SPACECRAFT Well we copy Gordo, sounds great.

PAO This is Mission Control Houston, loss of signal through Botswana. A minute and a half away from reacquisition through Indian Ocean station. As the Columbia came over Botswana, the crew was in the midst of the payload bay door cycling test, right door was down and the left door, or the por door was closed, but the starboard door was at the 4 ft. position. And by the end of the pass, both doors were down,

zero deflections using the theodolite transit to measure the structural deflections. All latches were down at the same STS-3 AIR/GROUND TRANSCRIPT t328j GMT 87:23:13 PAGE 2

time. Crew reported that the CRT, That is the Cathode Ray Tube, display was working normally in the Commander's position after the key change out. And Jack Lousma continued to offer to play Blue Hawaii again, on the downlink but didn't seem to be a great deal of enthusiasm here in the MOCR for hearing that again. Should be getting acquisition momentarily through Indian Ocean station, Mission Control standing by.

CAPCOM Columbia, Houston back with you through Indian Ocean for 6 minutes, over.

CAPCOM Columbia, Houston through Indian Ocean for 5 and 1/2 minutes, over.

CAPCOM Columbia, Houston through Indian Ocean, how do you read?

SPACECRAFT We hear you loud and clear through Indian Ocean, too.

CAPCOM Okay Jack, you're loud and clear now. And I've go a couple notes for you.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, first is an update on the perigee adjust times, if you should need to do a perigee adjust you should add 13 minutes to the perigee adjusts TIGs in the updates book, that's one three minutes.

SPACECRAFT Okay, I got 13 minutes (garble) the updates book.

CAPCOM That's affirm, and that'll be on page 1-5 of the updates book, if you need it.

SPACECRAFT Okay, we got that, stand by one please.

CAPCOM Okay.

SPACECRAFT Okay, go ahead Sally.

CAPCOM Okay Jack, the other thing that I've got is an update to the mini table for entry tomorrow, if you want to call up universal pointing GNC, OPS SPEC, I can just read the item numbers up to you, into get Northrup in all 3 slots.

SPACECRAFT Okay, I'm ready, go ahead.

CAPCOM Okay, item 25, we want a plus 17, that's one seven

SPACECRAFT Okay, I've got that in, what's next?

CAPCOM Item 26, we want at 2.

END OF TAPE

SPACECRAFT Manuever to PTC attitude of 224.5, in roll, pitch 187.4, and yaw 86.8, is that correct?

CAPCOM Roger Jack, that's correct, and also before you go to the PTC maneuver, we'd like you to change DAP A, that'll be DAP A7, the discrete rate to .135 degrees per second, which is 2 times or ORB rate.

SPACECRAFT Okay, do you want item 3, .135 correct?

CAPCOM That's correct Jack, and we don't want you to make that change to DAP A7 in your DAP book yet because you will be going to DAP A7 for a sleep prior to that, but when you get to the point, this point in the CAP we would like that change.

SPACECRAFT Okay, just before the maneuver we'll go to the DAP of .135, and that'll be in DAP A.

CAPCOM Roger, and all this is a change that the payloads people were interested in, this basically gets the bay into the correct configuration to get maximum benefit from the magnetic field measurements at the northern latitudes.

SPACECRAFT Okay, the vernier rate .135 it will be, just befor that maneuver.

CAPCOM Okay. Columbia, we're 1 minute to LOS, Botswana's next in 37 minutes, and one more note is that there is no water dump required tonight, and we see that you got the duct heaters on and the configuration looks good for the payload bay door cycle.

SPACECRAFT Okay, thank you. Just want to double check that body vector number 1, is that body vector 1 still going to be okay for the PTC roll?

CAPCOM That's affirmative Jack.

SPACECRAFT Okay.

PAO This is Mission Control Houston, LOS through Buckhorn. Next station is 35 minutes away at Botswana, voice relay station. The crew now prepared and ready to do the payloa bay door cycle test. They've been advised also, that they have no water dump tonight to worry about. We'll return in 34 minutes. To repeat again though, the Flight Director change of shift schedule with Neil Hutchinson earlier planned for 9 p.m. central has been moved to 8:30 p.m., that is 8:30 p.m. central, in the Johnson Space Center news room. At 6 hours 36 minutes into day 6, Mission Control Houston. This is Mission Control Houston, 10 seconds away from acquisition through Botswana voic relay station. The crew at this time should be at the start of

the payload bay door cycle test. And coming up on their evening meal. At 8 hours into day 6.

CAPCOM Columbia, Houston through Botswana for 6 minutes, over.

SPACECRAFT Okay, we're hearing you through Botswana. We got the port door closed and the right door is at the 4 ft. positior taking theo light readings.

CAPCOM We copy Jack.

SPACECRAFT I could play you a little Blue Hawaii, while you'r waiting.

CAPCOM Okay, we'd sure like that. And Jack, we're interested in the keyboard check out, whether you've had a chanc to make sure that that interface with CRT number 3 works.

SPACECRAFT Oh yes, sorry I didn't report that, it works normally.

CAPCOM Okay, that's good. And Jack, I do have some heate reconfiguration on 02 H2 tanks 3 and 4 when you get a break. Ar we'd like to do that over this pass, so that we can take a look at them over Indian Ocean.

SPACECRAFT You got a minute left or so?

CAPCOM No, we got 4 and 1/2 minutes.

SPACECRAFT Okay, stand by one, please. Probably wanted to know that the vertical reading on target number 5 is 80.702.

CAPCOM Roger Gordo.

SPACECRAFT Okay, now go ahead with the heater switches pleas Sally.

CAPCOM Okay on panel A11, we'd like 02 and H2 tank 4 heater...

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CAPCOM Roger Gordo.

SPACECRAFT Okay, now go ahead with the heater switches pleas Sally.

CAPCOM Okay on panel A11, we'd like 02 and H2 tank 4 heater...

END OF TAPE

CAPCOM ....25.

SPACECRAFT See you at Hawaii.

CAPCOM Roger, and that's 43 minutes from now.

PAO This is Mission Control Houston. Loss of signal through Botswana voice relay station. A little bit of a report there from Commander Gordo Fullerton about the temperature conditions aboard the Spacecraft. Last night the cabin got cool enough to where both crewmen did put on their jackets. The temperature control has been turned to full cool. Next station 42 minutes from now, will be through Guam, I beg your pardon, through yeah, that's right. Hawaii's the next one at 42 minutes which will be part way through orbit 102. At 6 days 5 hours 43 minutes, STS-3, this is Mission Control Houston.

CAPCOM Columbia, Houston through Hawaii for 2 minutes, over.

SPACECRAFT Kind of a short pass through Hawaii, isn't it Sally?

CAPCOM That's affirmative, I don't think there's even tim for a song this time.

SPACECRAFT Yes, I know (garble) of that. I guess I should of had another Hawaiian song besides Blue Hawaii, huh?

CAPCOM Roger Jack, I'm not sure how much of this we could take.

SPACECRAFT I, we think that I'll see and hear more of that song in the future.

CAPCOM So do we.

SPACECRAFT I don't know how you could possibly dream up anything on such a plain vanilla crew.

CAPCOM Well, we'll have to work at it pretty hard Jack, but we will try.

SPACECRAFT I noticed you've already been pretty original on that respect.

CAPCOM Don't have any idea what your talking about sir. Columbia, we're 30 seconds to LOS and Stateside's next at 0630. And Jack, we noticed that the Y, Y tracker needs to have its shutters cycled again.

SPACECRAFT (Laughter) I should have known.

PAO This is Mission Control Houston. Loss of signal e Hawaii. Next station Buckhorn in 3 and 1/2 minutes roughly. Final Stateside pass of the afternoon. Columbia now in orbit 102. The change of shift briefing with Neil Hutchinson, which earlier had been scheduled at 9 p.m. central has been moved up t 8:30 p.m. central in room 135, Building 2, JSC etc. Back in 3 minutes at Buckhorn, this is Mission Control Houston. 6 hours 2 minutes.

CAPCOM Columbia, Houston with you through Buckhorn for 4 minutes.

SPACECRAFT Okay, it's through Buckhorn, we got you loud and clear.

CAPCOM Roger Jack, you're loud and clear also. And Jack, if you've got a CAP out, we've got a change to the PTC attitude for tomorrow morning, that I'd like to read up. That's on page dash, I'm sorry, page 4-133 in the CAP.

SPACECRAFT Okay, stand by. Okay, ready to copy.

CAPCOM Okay, this is under the auto maneuver to PTC. We like you to maneuver to a roll of 224.5, pitch 187.4, yaw 86.8.

SPACECRAFT Okay I copy, auto maneuver to PTC attitude of 224 in roll, pitch 187.4, and yaw 86.8, is that correct?

CAPCOM Roger Jack, that's correct, and also before you g to the PTC maneuver, we'd like you to change DAP...

END OF TAPE

CAPCOM FM and the S-band looked real good.

SPACECRAFT Okay, that's good news, sounds everythings getting ship shape.

CAPCOM That's right. I think they'll be ready for you. Columbia, we're 1 minute to LOS. Botswana's next in 30 minutes and you might be interested to know that the X-ray experiment ha already detected strong signals from two solar flares, both of which were confirmed by NOAA. So it looks like we're getting more good scientific data.

SPACECRAFT Okay, that's good news too, thank you Sally.

CAPCOM Okay, and we'll talk to you at Botswana.

SPACECRAFT See you in thirty.

PAO This is Mission Control Houston. Loss of signal through Mila. Next station is Botswana in 28 minutes. During the stateside pass it was reported by the crew that the electrophoresis equipment verification test had been stowed. Al put away for landing. The APU fuel pump valve cooling circuit was turned off. And as much as the ground controllers here were satisfied with the earlier APU 3 test and the current condition of auxiliary power unit number 3. And the science staff support room has reported that the X-ray experiment on the OSS-1 pallet has detected two solar flares so far. Back in 27 minutes through, 27 minutes through Botswana. This is Mission Control Houston at 5 hours 10 minutes into day 6 of STS-3.

CAPCOM Columbia Houston through Botswana, over.

SPACECRAFT Hello there, through Botswana. We just completed the RCS plume impingement test and we're waiting for beyond 5:4(to turn off the OEX power. Got any more word for us?

CAPCOM Negative, Jack, we have nothing to send you this pass. Just one note that when you get ready for the in preparation for the payload bay doors, when you turn the duct heaters on you can expect an FDA alert and there's no problem with that.

SPACECRAFT Okay, we'll be looking for it, thank you very muc Sally.

CAPCOM Columbia Houston, if you have not gotten around t the keyboard checkout yet, the procedure on the malf book, we think that if you'd like to do that whole checkout it's fine. It's really for a replaced keyboard and the thing that's most important to us is to verify that that key still has a good interface with CRT number 3 as well as number 1. So we just wa

you to checkout that key with CRT number 3.

SPACECRAFT Okay, we'll give it a try.

CAPCOM Okay.

SPACECRAFT Sally, we've probably been a little negligent in keeping you posted on what we did with the temp control control valve downstairs. It was not too long after we went to top sun that we decided to stop again and get warm in here and we tended in full cool. Let me ask, can you all tell down there what it's in or maybe I'm telling you something you already know?

CAPCOM Negative, we have no data on the temp controller.

SPACECRAFT Next question is, do you want any?

CAPCOM That's affirmative, Gordo, we'd love to hear anything you've got to tell us.

SPACECRAFT Nothing significant other than we for some reason we have been thinking we were in full cool but we took a check and now we were in full hot, which we had put there must have been prior to going to sleep on one of the nose sun nights. And so anyway, we went to full cool anticipating we needed to cool i off cause it was kind of getting kind of warm upstairs here because the sun coming in mainly front windows. We had the overhead shades in. We have left it in full cool all this time. It's still there now. The temperatures actually cooled off last night to the point where we both put on our jackets, bu it was just about right that way.

CAPCOM Roger Gordo, we copy that, thanks for the report. And we're going LOS. We'll talk to you at Hawaii at 0625.

SPACECRAFT See you at Hawaii.

CAPCOM Roger, and that's 43 minutes from now.

PAO This is Mission Control Houston. Loss of signal through Botswana voice relay station. Little bit of a report there from commander

END OF TAPE

CAPCOM Columbia, Houston through the states. Over.

SPACECRAFT Hello through the states.

CAPCOM Hi Jack. You're loud and clear and I've got a few notes for you this pass.

SPACECRAFT Okay. I was just dumping the trash. Seems like a appropriate job for a guy in my position. So, go ahead.

CAPCOM Roger. I've got no comment at all on that. And, the first note is on the IFM that Gordo's doing. We want to add a step to the IFM checklist which is just to put some gray tape over the hole that you leave behind on the aft keyboard. We don't want anything drifting in there during entry.

SPACECRAFT He's way ahead of you, way ahead of you.

CAPCOM I should have known.

SPACECRAFT What else you got there for us Sally?

CAPCOM Okay the next thing that I've got is up on panel L2. We'd like the N2 system 2 reg inlet valve closed with the talkback to closed.

SPACECRAFT All right. N2 system 2 reg inlet coming closed now.

CAPCOM And just for information, we haven't seen the leak come back but we didn't want to enter the sleep period with a potential leak that wasn't isolated.

SPACECRAFT Okay, I understand.

CAPCOM Okay the next one, after running the APU this morning, we're now ready to take the APU fuel pump/valve cool alpha to off and APU 3 controller power to off.

SPACECRAFT All right. The fuel pump/valve cool switches both off and since the A was on course, and the controller power is off on number 3.

CAPCOM Okay that's good. And Jack, we'd also like you to cycle the shutter on the -Y tracker please.

SPACECRAFT Okay.

CAPCOM And if somebody's got a CAP in their hands and could turn it to page 4-123, like to call your attention to a step under the VRCS plume impingement test in the middle of the page in the CDR column.

SPACECRAFT Standby. Okay ready to copy.

CAPCOM Okay. The last step of the VRCS plume impingment test called out in the CAP is on R 11 to take the OEX power to off. We'd like to make sure that you perform that at 5+40. There should be a little time critical diamond next to that which was left out of the CAP and the reason is we've got a stored program command that cleans up the recorder that times out at 5:39 that we need to have in there before you take the power off.

SPACECRAFT ...5:40 or later. Huh?

CAPCOM That's correct.

CAPCOM And Columbia, that's all the switches that I've got for you to throw but I've got a couple questions.

SPACECRAFT Yeah.

CAPCOM Okay, just so that we understand where you are in the EEVT, since all 8 of the EEVT samples are complete, we were wondering whether you've had time yet to stow the experiment. Button it up.

SPACECRAFT Jack stowed it during breakfast. It's all put away.

CAPCOM Okay that's good we copy. And in order to get the ops recorders cleaned off, we were thinking about terminating recording ICOM after this pass and we'd like to ask you how you feel about that. Whether you've got anything you'd like to put on the recorders this next rev or whether we can stop recording voice after the states.

SPACECRAFT That sounds okay to us.

CAPCOM Okay we'll plan on that. And that's all I've got right now.

SPACECRAFT All right.

CAPCOM And Columbia, we're going into a 2 minute LOS over the states.

CAPCOM Columbia, Houston we're back with you for 2 minutes.

SPACECRAFT Okay.

CAPCOM And Jack, just for information although we didn't have support from the White Sands S band station this pass, we did get a good set of runs off this morning with them and the S

band looked real good.

SPACECRAFT Okay that's good news. Sounds like everything is getting ship shape.

CAPCOM That's right. I think they'll be ready for you.

END OF TAPE

SPACECRAFT ...top of down in the hole there and does that screw have to come, be turned many turns or just a turn to loosen or does it have to come clear out?

CAPCOM Gordo, we think you need to turn that till it bottoms out.

SPACECRAFT Again the answer please.

CAPCOM Gordo, you need to turn it counter clockwise, it will be many turns. And just a piece of advise, T.K. did that over in the SMS and he found that he was able to turn the screw just one or two turns then he had to reach down there with his, put his fingers down in the hole, left by the top of the key, and actually jiggle it around till he was able to turn the screw again.

SPACECRAFT Well I'm not sure I understand successfully this whole plastic liner slides out, is that the idea?

CAPCOM That's correct. Gordo, it'll be a column about 2 to 2 and 1/2 inches long.

SPACECRAFT Do you wanna cap the screw, or is it going to float away when it gets loose?

CAPCOM That'll be a captive screw, Gordo.

SPACECRAFT Okay.

CAPCOM And Columbia, just a question, we were wondering whether you had started EEVT sample number 7 yet.

SPACECRAFT No, sample 7 I did it last night.

CAPCOM Roger we copy Jack, that's good work.

SPACECRAFT Okay, I got it out of there. Can you just tell me something to do quick to see if we succeeded, otherwise I'll have to go get the MAL book and probably won't make it for this pass.

CAPCOM Okay Gordo, we think all you need to do is close the circuit breaker on L4 for the left CRT.

SPACECRAFT Okay, it's in.

CAPCOM Okay, and turn the power on to that CRT.

SPACECRAFT It's done, we'll let her warm up here.

CAPCOM Okay, and that's all you need to do. And Gordo, we're ready for you to try a fault sum.

SPACECRAFT Okay, you called it, fault sum popped right up there, that was it.

CAPCOM Alright that's great. Score another one for IFM.

SPACECRAFT You guys are alright!

CAPCOM Gordo, that means to us that we're not in any rush for you to do the complete key change out, you can do whatever you like in the CAP there, and complete the IFM and the checkout at your leisure. Looks like this is going to do it for us.

SPACECRAFT Okay, I'm going to take this baby over and, well I'm just going to stow this back, and then I'm going to replace it with the one out of the back CRT, the back keyboard.

CAPCOM Alright, that sounds good.

SPACECRAFT For doing that, he gets an extra Gatorade.

CAPCOM Roger that. And Columbia we're 30 seconds to LOS. States are next at 4:55. And Gordo, you probably noticed you can just use, if you want to be able to read spec on the top of the key that you replaced into the left CRT you can just use the top of that key, the spec part of that key on the acknowledge key that you pull out of the aft and that'll read properly for you.

SPACECRAFT In other words, just use the old top and put in a new bottom.

CAPCOM That's it.

PAO This is Mission Control Houston. Spacecraft at this time going back to the top sun attitude. Gordon Fullerton changing out the keys in the Commanders keyboard. We're 15 minutes away from Goldstone overlapping MILA tracking stations on the next to the last stateside pass of the afternoon. At 4 hours 41 minutes into day 6, Mission Control Houston.

END OF TAPE

PAO Mission Control Houston. A brief pass there through Ascension. As mentioned by the crew they have not attempted to change out the keys between the two keyboards. They want to wait until they have a longer period of time in which to do it right. If the key changeout does not solve the problem the next step will be to changeout the display electronic units, the DEU's, which in essense are minicomputers of their own, with their own logic and circuitry. And they're buried down inside under the panels and a little bit more complicated than simply changing out keys. Next station in 6 minutes. Botswana again an extremely low elevation angle pass, 2.9 degrees above the horizon, above the southwest horizon at that voice relay station. Day 6 3 hours 57 minutes. Mission Control Houston. This is Mission Control Houston. 30 seconds until acquisition through Botswana voice relay station. Should be a rather brief pass if indeed they do contact the crew.

CAPCOM Columbia Houston through Botswana, how do you read?

SPACECRAFT Loud and clear.

CAPCOM Roger, Gordo, you're the same. We've got about 2 minutes in this pass and we know you're busy on the visual beam search but we would like you sometime within the next 30 minutes or so to at least pull out the spec key on the left keyboard. Repower that keyboard and try something like the fault sum key just to make sure that the constant signal is off that keyboard.

SPACECRAFT Alright, we'll do it.

CAPCOM And the reason for that is we'd like to know by the next Guam pass what the answer to this is so that we can reschedule the 2 to 2 1/2 hour IFM. Columbia, we're 20 seconds LOS. Guam is next in 28 minutes.

SPACECRAFT Okay.

PAO Mission Control Houston. Loss of signal at Botswana. Nearing the end of orbit 100 for STS-3. Crew is advised to go ahead and remove that pesky key or the one that's suspect key from the commander's keyboard so that at least they can determine whether or not a short does exist in the keyboard itself or the key. Next station is 27 minutes away at Guam. At 4 hours 6 minutes of flight day 6 Mission Control Houston. This is Mission Control Houston. Acquisition through Guam in 30 seconds. Beginning of orbit 101 for Columbia on this 3rd flight.

CAPCOM Columbia Houston through Guam, over.

SPACECRAFT Okay, we got you at Guam Sally. Gordo's working on the key. We've completed the VCAP visual beam search. I noticed that the sun came up and we're still waiting to maneuver to top sun attitude. Maybe we should have updated that maneuver time, or do you want to stay in this attitude?

CAPCOM Standby Jack. Let us look at it.

SPACECRAFT Okay. I've got it now. We've got to be in this attitude for 6 more minutes before we start maneuvering. Sally, you got anybody who's ever done this before down there?

CAPCOM Yes we do Gordo, and for Jack, we'd like you to go back to top sun now.

SPACECRAFT Okay we're on our way. Okay, I got the cap of the key off. The little screw is sort of at the top of down in the hole there and does that screw have to come, be turned turn many turns or just a turn to loosen or does it have to come clear out?

CAPCOM Gordo, we think you need to turn that until it bottoms out.

END OF TAPE

SPACECRAFT ...okay, that's a good idea.

CAPCOM And Gordo, when you've had a chance to look at that, you can go ahead and start the procedure any time to change out that key. Once you get it changed out, there is a procedure in the malf book to check out the keyboard after the key has been installed. And you might want to write down that's on page 5-116 in the malf book.

SPACECRAFT Roger. 5-116 for a check out after we get the mechanical work done.

CAPCOM Affirm.

SPACECRAFT Sally, let me mention something while I just happen to be thinking of it, you know the vacuum vent knob that we're talking about being loose, well it came clear off. If somebody wonders where it went, I've stowed it in the inflight maintenance tool drawer in the slot marked ball peen hammer.

CAPCOM Roger we copy.

SPACECRAFT It's interesting, that that's got a little tiny allen head screw in it that we don't have an allen head wrench to fit.

CAPCOM We copy that. And we'll probably get that fixed soon.

CAPCOM Columbia, Houston. We're 30 seconds to LOS. Ascension's next at 3:52 and just a reminder about the auto maneuver to the IECM gas release attitude that's coming up in about 8 minutes.

SPACECRAFT Okay. We've got it all typed in on CRT 4 Sally and the future maneuver is selected for 3:45.

CAPCOM You're way ahead of us Jack.

SPACECRAFT I haven't got around to the key change out yet we're making sure we're all set for this pass and then we'll work on it later.

CAPCOM Roger, no hurry on that Gordo.

PAO This is Mission Control Houston. Loss of signal through Bermuda. 13 minutes away from reacquisition through Ascension Island on this 100th orbit of the earth by Columbia on it's third flight into space. Crew going through a change out procedure read up to them whereby the key on the commander's keyboard could be swapped from one in the aft station keyboard. And hopefully by Ascension we'll have some report from the crew

on whether that was successful bypassing an apparent short that takes out one mode of 3 available to him in his cathode ray tube display. 12 minutes away from reacquisition at Ascension Island. Mission Control Houston at 3 hours 39 minutes day 6.

PAO This is Mission Control Houston. 20 seconds away from acquisition through Ascension Island. An extremely low pass to the southwest of that station and 1.2 degrees above the horizon. Perhaps as much as 2 minutes of time at Ascension, assuming we do make contact. We're standing by at this time.

CAPCOM Columbia, Houston through Ascension for two minutes over.

SPACECRAFT Okay we got you through Ascension. We're almost in the gas release attitude. I had to double the DAP in order to get there.

CAPCOM Roger.

CAPCOM Columbia, we're one minute to LOS. Botswana is next in 9 minutes. And Gordo, we don't want to interrupt your work on the IECM gas release or the beam search, but we would like to know the result of the key change out, because if that does not fix the problem then we're looking at a much more involved IFM. Probably a DEU changeout.

SPACECRAFT Okay, well we haven't done anymore. We decided to just put that off till, and do this right. And, but we'll let you know as soon as we do it.

CAPCOM Roger, Jack.

END OF TAPE

SPACECRAFT Okay, we'll save'em for tomorrow. Sure eager to get after them though, that's why I asked you, I thought maybe you'd let us have some today.

CAPCOM Roger. And Columbia, we're 1 minute to LOS. The Silver team will pick you up at the States, and the Crystal team's enjoyed working with you today, and we'll look forward to working with you tomorrow for a reentry and landing.

SPACECRAFT Well thanks to you and Brewster and Harold and all the gang down there, and you guys get good and rested up so we'll have a good one tomorrow, and we'll look forward to working with you.

CAPCOM Will do.

PAO This is Shuttle Mission Control, at 6 days 3 hours 16 minutes. We're deferring uplinking further instructions to the crew on remeding that Cathode Ray Tube lockup, until there is some more ground testing performed on it here at Houston. A team in SAIL, the Shuttle Avionics Integration Laboratory, which is equipped similiarity to the vehicle is going to try to replicate the failure that the STS-3 crew is experiencing and then work up a good solution to it, and based on the findings in the Labratory here we shall than advise the crew on the most effecient and effective way of freeing up that CRT. Salutations from CAPCOM Brewster Shaw were transmitted to the crew representing the close out of this team's shift today, and next time they come on board, they'll be turning the vehicle around and getting it ready to land at White Sands. Neil Hutchinson and the Silver team, the orbit team, are now assuming positions on console. Flight Director Harold Draughon has affirmed his Press Conference will be on time at 2:00 in the Building 2 newscenter, and once again it'll be certainly an appropriate point to direct questions concerning entry day and in as much as it will be his final change of shift briefing before that event occurs. At 6 days 3 hours 17 minutes, this is Shuttle Mission Control.

CAPCOM Columbia, Houston, the silver team is back with you over the States.

SPACECRAFT Oh, hello to all the silver team, Sally, Pinky, Neil, and everybody, nice to hear from you.

CAPCOM Columbia, Houston we think we may have a solution to your CRT 1 problem, and it involves what we hope is going to be a short IFM procedure.

SPACECRAFT Alright, hold a second till I get upstairs and we'll have a look at it.

CAPCOM Okay, and you might grab the IFM checklist on your way up.

SPACECRAFT Alright, glad you mentioned that. And I'll go back down. Okay Sally, I'm upstairs ready to copy.

CAPCOM Okay Gordo, we think that the problem may be with the spec key, just a single key on the left keyboard. And the appropriate page is page 52 in the IFM checklist, it's a keyboard key change out. So we're looking at changing out a single key.

SPACECRAFT Okay, it works of course with CRT 3, so your thinking now that it shorted on it's the one that goes to DEU number 1?

CAPCOM That's affirmative Gordo, it's got two sets of contacts, one set to CRT 3 and one to CRT 1, and we think the one to CRT 1 is shorted, and it's locking out your keyboard.

SPACECRAFT Oh, I hope your right. Say again the page.

CAPCOM Page 52, and we recommend that you use the aft acknowledge key to put in place of the left CRT spec key, and we don' want you to replace the spec key in the aft keyboard. We'd like you to leave that out, so we don't get a constant signal into the aft keyboard.

SPACECRAFT Oh, I see, you don't want to, you just want to leave a hole there for acknowledging the aft, okay, that's a good idea.

END OF TAPE

CAPCOM days of the flight so far and on five of the six days you would have gone to runway 1 7 and three of those five 1 7 opportunities would have been left turns based on the winds aloft. They just weren't that strong. One of the days would have been Friday. We would have probably selected runway 2 3 to get a suitable crosswind for the DTO and that would have been a left hand turn also.

SPACECRAFT Okay understand.

CAPCOM Concerning the deorbit itself, should be nominal. It will be the burn on rev 115, landing on 116. If you remember from the SIMS the burn will occur over Yarragadee. We've targeted on that burn to allow two minute downmoding capability to complete on aft RCS. The phasing of the roll reversals and all the maneuvers should be just the same as on your cue card as if you were going to Edwards. The S-band coverage, if we did not have the White Sands S-band we'd be approximately 2 and 1/2 minutes, however, there is no reason to expect that we will not have complete S-band coverage all the way to touchdown, over.

SPACECRAFT Okay, and where are you going to pick it up?

CAPCOM We anticipate picking up S-band at about the nominal time around mach 11, Jack, it could be a little earlier but not guaranteed. The C-band tracking will occur much earlier even greater than mach 18, over.

SPACECRAFT Okay, so you got continuous coverage then on in with the TULA PEAK. There's no gap in there.

CAPCOM That's affirm and we should also have continuous UHF coverage also. We are shipping you up via teleprinter message a new prebank table which is appropriate for Northrup and there is also a message onboard, number 58 alpha, which discusses the pros and cons and considerations of the right turn to runway 1 7 and we'd like to have you to take a look at that at your leisure and if you have any questions we can discuss those later today or tomorrow morning, over.

SPACECRAFT Okay, I believe I read that one this morning when I first got the messages off the teleprinter and we just got the last input that you made and so I think we're up to date on messages. And have looked it over and that is understandable. 58 alpha, that is.

CAPCOM Okay, good, the only caution there, of course, is getting manual speedbrakes in open, full open, trying to beat the auto system a little so you can keep the Q-bar EAS from getting high and it helps chase out also.

SPACECRAFT Yea, I understand the problem in that regard.

CAPCOM Okay, Jack, the only other consideration was systems impacts for entry and the only two things we have there was we've altered the sequence of closing vent doors because of that circuit breaker that's being mechanically held in. The reference on that is 7 alpha and the APU shutdown temperature criteria has been relaxed. That's message 33 alpha. We're about 20 seconds LOS now and next is Hawaii in about 8 minutes.

SPACECRAFT Okay thanks a lot, Steve, understand conversation and we're aware of all those messages and that's a good brief, thank you.

CAPCOM Okay, thank you, and that's all we have Jack.

PAO Mission Control Houston. Just less than a minute away from acquisition of signal through Hawaii. And we think the crew ought to be about finishing up its lunch period. There's a brief keyhole in the Hawaii pass and we'll have a brief loss of signal as it passes through a little gap in the ground coverage through there. Have voice contact in a moment.

CAPCOM Columbia Houston, through Hawaii for 2 and 1/2 minutes, over.

SPACECRAFT Aloha Steve, we're standing by. Just finishing up lunch.

CAPCOM Sounds good. We want to congratulate you. You're now in orbit 100.

SPACECRAFT Well, what do you call somebody who's done that? You don't call them a centennian, what would he be called? You have to think up a name.

CAPCOM We'll think about it. The VCAP beam visual search coming up, you can start on time and you may want to use that bar magnet again today to help you search for the beam, over.

SPACECRAFT Okay, we'll do that, good call.

CAPCOM And Jack, the answer to your question on the beverages is we believe those are for tomorrow for entry day, over.

SPACECRAFT Okay, we'll save them for tomorrow, thank you.

END OF TAPE

CAPCOM ...that we spoke of earlier do not involve anything on your part, you can just go ahead and eat lunch and listen. If we do have good COMM during this pass.

SPACECRAFT I'm not sure we got good COMM, we can give it a try. We got that last transmission. Go ahead.

CAPCOM Okay, I'll do it a piece at a time and then see if you copy. The weather forecast for tomorrow at Northrup is good. 12,000 scattered, 25,000 scattered, good visibility, the winds in the morning will be light, out of the east southeast, and picking up through the afternoon out of the southwest with peak gusts at 15 knots. How copy?

SPACECRAFT Okay we copied part of it. We lost the middle of it.

CAPCOM Okay, Jack. We better try this at Guam. Go ahead and eat lunch and we'll talk to you about it at Guam.

SPACECRAFT ...and did you copy our request we need to know where the extra gatorade has been stowed. We can't seem to find it, although we saw it once about three days ago.

CAPCOM Roger, we'll look for it.

CAPCOM Columbia, Houston. We believe the gatorade may be in MF14G that's Golf and how do you read this transmitter, over.

SPACECRAFT Well, not reading you very well at all. I think maybe you just said what we found out. We found it in where the food warmer was. So we got that problem solved.

CAPCOM Roger.

PAO Mission Control at 6 days 2 hours 51 minutes. Clearly the crew has it's appetite back and is hunting around the vehicle for food. Have loss of signal in about 2 minutes. Mission control team doesn't really plan to engage the crew into a whole lot of dialog during the lunch period. There'll be a brief pass at Guam, during which we'll have about 4 1/2 minutes of contact. Once again Flight Director Harold Draughon will have his change of shift briefing at 2:00 and as a reminder, he will of course be the flight director for deorbit and entry and landing on Monday and in addition to questions pretaining to his present current shift, it will certainly be a prudent time to submit inquiries concerning Monday's deorbit landing activities. Change of shift briefing at 2:00 in building 2 room 135, Johnson Space Center. Mission Elapsed Time 6 days 2 hours 52 minutes, this is Mission Control Houston.

CAPCOM Columbia, Houston. We're 20 seconds LOS. Next is Guam in about 8 minutes.

SPACECRAFT Okay I think that will be better COMM then.

CAPCOM Okay.

CAPCOM Columbia, Houston through Guam. Over.

SPACECRAFT Okay we're hearing you a lot better now Steve and while we're eating lunch well you can go ahead and talk. We found the gatorade, you probably heard that. I thought I read in the detailed supplementary objective we were supposed to have that on flight day 7 which will be today, but the message we got here says tomorrow. Now which is correct?

CAPCOM Jack I didn't quite understand what you're getting at there. Would you say again please?

SPACECRAFT Yeah the question is on the gatorade. I thought I read that we were supposed to have it on flight day 7 which is today. But the message I got on teleprinter said it applies to we ought to drink that tomorrow. So, I'd like to have that clarified.

CAPCOM Okay, we'll clarify that, during this pass, and I'm ready to start talking entry first of all. The weather for tomorrow is to be good, the forecast is 12,000 scattered 25,000 scattered, good visibility, the morning winds will be light out of the east southeast, picking up in the afternoon and swinging around to the southwest out of about 220 with peak gusts to 15 knots. Over.

SPACECRAFT Okay copy all that.

CAPCOM Okay the jet stream winds at 40,000 feet should be out of the west at about 80 to 90 knots. That may still dictate a right turn for you if we go to runway 17. Over.

SPACECRAFT Okay I understand.

CAPCOM Roger, we've been tracking the surface winds and the winds aloft through the 6 or 7 days of the flight so far...

END OF TAPE

PAO Mission Control Houston at 6 days 2 hours 33 minutes. The flight control team is discussing the procedures for recovering the cathode ray tube display. Flight Director Neil Hutchinson and the Silver Team, his team of flight controllers, are beginning to report for debriefing for assumption of responsibility for the conduct of this mission and Flight Director Harold Draughon and his crew are making preparations to hand over to the Silver Team. Harold Draughon will conduct his change of shift briefing at 2:00 central time and this will represent the last opportunity for news media to get their entry questions into him. Harold Draughon will be the entry team flight director during the reentry and landing process Monday. And, this will be the last change of shift briefing at which he will officiate and all questions pretaining to not only this present shift on the console, but to that entry process would most appropriately be directed at this time. Mission Elapsed Time is 6 days 2 hours 34 minutes. Acquisition of signal at about 12 minutes through Guam. Columbia coming up on it's 100th orbit of the earth. This is Mission Control Houston.

PAO This is Mission Control Houston coming up on a UHF pass in a minute and a half at Yarragadee. Columbia entering it's 100th orbit of the earth. Still talking over the CRT anomaly. The point of failure could be in one of three areas. Could be the cathode ray tube itself, could be the keyboard to which is used to put commands into the cathode ray tube and computers or it could be in the display electronics unit which is the point of interface between the keyboard and the CRT. And the flight control team is instructing the crew, Jack Lousma, on procedures aimed at isolating that failure and identifying the problem and determining both the efficient and expedient way of repairing it. Mission Elapsed Time 6 days 2 hours 46 minutes, just a few seconds away from acquisition of signal at Yarragadee. This is Shuttle Mission Control.

CAPCOM Columbia, Houston through Yarragadee for 7 minutes over.

SPACECRAFT Okay we got you through Yarragadee. We're working on lunch among other things.

CAPCOM Copy that Jack. We believe that the failure in the left keyboard may be in the spec key itself. It could have a problem in it's interface with CRT 1 and still be okay for CRT 3. So, we're still thinking preliminarily about this, but it could involve a key change out later on, but that's not a sure thing yet. Over.

CAPCOM Columbia, Houston. Did you copy the last on the spec key. Over.

SPACECRAFT That's a negative. I'll tell you one thing we did

was we cycled the power and the spec, the display came back up.

CAPCOM Okay we copied that. Our thoughts were that the spec key itself may have a problem in that it has a bad interface with CRT 1 and could still function properly with CRT 3. It may involve a spec key change out later today, but that is not a sure thing yet, Jack.

SPACECRAFT Well, the (garble) locked up when we told you about the problem in (garble).

CAPCOM Copy that. One thing we would like to do this pass and perhaps could finish at Guam if we needed to was to have that discussion on the entry tomorrow and we don't want to interrupt your lunch. There's nothing you need to copy down, we'd just like to discuss some things with you while you listen if that's okay.

SPACECRAFT Steve, we didn't get that last sentence. You're cutting in and out.

CAPCOM Okay Gordo. If the COMM is good on this pass, one of the things we would like to do is have that discussion on the entry tomorrow. Some general points that we spoke of earlier. It would not involve anything on your part, you can just go ahead and eat lunch...

END OF TAPE

SPACECRAFT gave us normal responses.

CAPCOM Copy that.

SPACECRAFT Yea, that should have been no out of that block, I'm sorry, block 11 is a no.

CAPCOM Copy standby. And Jack, we think we may have put you into the malf at the wrong block, we believe you'd have success if you were to enter at block 7 and try it from there, over.

SPACECRAFT Okay, standby.

CAPCOM And we believe that would probably lead you through to block 8.

SPACECRAFT Okay, we'll take a look. Okay, right, I did a spec 22 on CRT 3, from the left keyboard and I got a good spec 22 so it looks like block 8.

CAPCOM Okay, copy that, we'll talk to you some more next at Botswana. We're 30 seconds LOS and Botswana's in 5 minutes, over.

SPACECRAFT Okay.

PAO This is Mission Control Houston. Loss of signal. We'll reacquire again in 4 and 1/2 minutes through Botswana. Mission elapsed time 6 days 2 hours 23 minutes. And flight control team is discussing additional steps which they asked the crew to perform to further isolate the problem with that CRT. Again, CRT number 1 is right in front of the commander and since they sim and train and work with that cathode ray tube, on preparation for the flight why they like to have that one working during the entry and on orbit activities so there will very definitely be a substantial effort to get that cathode ray tube working again. 3 and 1/2 minutes till acquisition of signal at 6 days 2 hours 24 minutes this is Shuttle Control Houston. Mission Control at 6 days 2 hours 28 minutes just moments away from acquisition of signal at Botswana and we'll undoubtedly hear some more dialogue about the cathode ray tube display in front of commander Jack Lousma. Voice contact momentarily.

CAPCOM Columbia Houston through Botswana for 4 minutes, over.

SPACECRAFT Go ahead. We just, Gordo just finished the SUSIM offset pointing and we're ready to talk about the CRT some more if you wish.

CAPCOM We're ready, go ahead.

SPACECRAFT Well, we haven't done any more, We were just wondering what you did. We're standing by to go to block 9 if you wish.

CAPCOM Roger, Jack, we're ready for you to go to block 9 and you'll have to describe your occurrences to us, we have no data at this site.

SPACECRAFT Okay, what's it say there Gordo? Okay, Gordo wants to look this over for a minute too and then we'll go on to block 9.

CAPCOM Roger.

SPACECRAFT Okay, what we did was to select the left CRT, cycle the power, and we have a big X with a poll fail and we can't get anything on scratch pad line. Gordo's going to do a zero three and a one one GPC CRT select to see if we can get it back up.

CAPCOM Copy that, one minute LOS Jack.

SPACECRAFT Okay, Gordo did the zero three and we got a big X on three and the one one gave us universal point back up on CRT 2, so I shall see now if I can collect spec 22?

CAPCOM Roger, go ahead, 30 seconds LOS.

SPACECRAFT I can't get a resume on CRT 1 or FAULT SUM or GPC CRT. Any key stroke won't show up on CRT 1 or do anything to it.

CAPCOM Okay, we copy all that, we'll think about it and see you next at Yarragadee in about 13 minutes.

SPACECRAFT Okay, thank you.

END OF TAPE

PAO When he was calling up a display the Mission Control center team called up a MAL, their malfunction procedure, to him for him to try to free up the keyboard and we'll stand by to hear the outcome of his work on that Cathode Ray Tube display. Mission elapsed time, 6 days 2 hours 8 minutes. We're 7 minutes away from acquiring signal through Ascension Island on orbit 99, and this is Mission Control Houston. This is Shuttle Mission Control at 6 days 2 hours 14 minutes. We're a minute away from acquisition of signal through Ascension Island on orbit 99. The science briefing scheduled for 12:00 has been post-poned till 3:00, that's the briefing which is going to provide a summary of science gathered on OSS-1 conducted by Dr. Werner Neuberg and some of the other investigators. Once again that briefing is changed from 12:00 until 3:00, it will be a follow on to the change of shift briefing, the 2:00 change of shift briefing with Flight Director Harold Draughon, those will occur in Building 2, room 135. Once again the OSS science briefing 3:00 this afternoon, with Dr. Werner Neuberg. Just 20 seconds away from acquisition of signal at 6 days 2 hours 15 minutes. This is Mission Control Houston.

CAPCOM Columbia, Houston through Ascension for 7 minutes, over.

SPACECRAFT Okay, Rich, gotcha through Ascension. On that MAL procedure, we did a GPC CRT 01, but of course you can't check out that keyboard on that CRT, I guess it means to jump over to CRT 3 and see if that keyboard works, is that right?

CAPCOM Stand by. And Jack, the intent is to see if that keyboard will work on CRT 3 which we show you having powered up right now.

SPACECRAFT Yes, that's what we figured. And we're concentrating on these offsets to try a get them done before sunset here, and then we'll really case the CRT in earnest.

CAPCOM Roger.

SPACECRAFT The thing I'm doing and I might have the POC listen up or SUSIM folks since there seems to be a nonlinearity in what the IMUs think our offsets are and what the P core, Y core does, what I'm doing is just starting with my standard old null that I've had for quite a while and just adding and subtracting the offsets of those everytime, other than re-reading the P core and Y core from each offset point.

CAPCOM Copy.

PAO This is Mission Control. Gordon Fullerton discussing the offset points relating to the SUSIM, Solar Ultraviolet Spectral Irradiance Monitor payload. And they'll

defer fiddling with the CRT until they've concluded those tests. The instruction of the flight control team here was to try to use the CRT number 1 keyboard to input commands to CRT number 3, the purpose of that being to determine whether the failure, the anomaly, is associated with the keyboard or with the Cathode Ray Tube display. Again, CRT number 1 is positioned right in front of the Commander and.....

SPACECRAFT Okay, in block 12 out of that MAL procedure, Houston.

CAPCOM Okay copy, Block 12.

SPACECRAFT I got it pretty well calibrated Steve, a one degree roll error into the DAP gives us a .90 correction on the spec 91, must be a scale factor there, or something.

CAPCOM We copy those numbers Gordo, thank you.

SPACECRAFT You want me to go onto Block 13 there Houston?

CAPCOM Stand by one Jack, we're discussing it.

SPACECRAFT Okay.

CAPCOM Jack, it appeared on the ground that the keyboard responses into CRT 3 were normal, but I believe your telling us that it showed all abnormal responses when you tried keyboard 1 with CRT 3, is that correct?

SPACECRAFT Yes, that is a double negative, I, the keyboard gave us normal responses...

END OF TAPE

SPACECRAFT ...And looks like there is some pretty high winds at altitude.

CAPCOM That's affirm Jack, but it's good there today and will be good tomorrow too. Columbia, Houston, 4 and 1/2 minutes left in this pass. We need you to cycle the Y star tracker shutter please.

SPACECRAFT Okay. And comments for the SUSIM troops, we find when we put in a half a degree offset we don't get a half of a degree of the Y core, we only get about .42 degrees or so.

CAPCOM Okay, we copy that Gordo, thank you.

SPACECRAFT We got a strange happening on the CRT 1 right now, I was trying to do a spec 22 and all I could get in was spec, and I can't get anything else in there.

CAPCOM Copy that Jack.

SPACECRAFT That's CRT 1.

CAPCOM Okay we copy, CRT 1.

PAO This is Shuttle Mission Control at 6 days 2 hours 4 minutes. Still during an acquisition of signal period over MILA and Berumuda for another 2 and 1/2 minutes at contact with the crew on orbit 99. The...

SPACECRAFT It looks like the number 3, correction number 2 and 4 CRTs are working okay.

CAPCOM We copy, 2 and 4 working okay.

PAO Crew did some unscheduled testing for the Remote Manipulator System officer here in the control center. The Remote Manipulator System 3 previous times during this flight, not today but earlier in the mission had been activated when it was in an extremely cold mode and on each of those activations the RMS, Remote Manipulator System, engineer got an alarm, which turned out to be not problematic and the arm has obviously functioned well throughout all of its testing. With the vehicle in its present top sun configuration the temperatures in the payload bay had warmed up substationally and the Remote Manipulator System officer asked that the arm be turned on to determine if the alarm that they had received earlier was an artifact of those cold temperatures. Crew powered on the arm for the systems officer and got a reading of a different nature, and the Remote Manipulator System...

CAPCOM Columbia, Houston we have a recommended malfunction procedure, if you're ready to copy.

SPACECRAFT Go ahead, I'm looking at them.

CAPCOM Okay, Jack, MAL 5.4 Delta, page 5-39 Block 10.

SPACECRAFT Okay, I'll ease on over to there.

CAPCOM And Columbia Houston, we're 30 seconds to LOS now. Next is Ascension in 9 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control. To continue with that RMS situation, the RMS officer recognized that the temperatures in the bay are substationally warmer now than they had been earlier, and asked that the arm be powered on to see if the alarm they received earlier was a product of the cold temperatures in there. And the crew powered on the arm, the systems engineer here in the Mission Control center got a different reading then was received earlier, and the belief by the RMS officer is that's just transient alarm, doesn't suggest a failure problem and it's not going to inhibit function of the arm at all. No further testing or trouble shooting's going to be done on it and other than the curiosity associated with the relationship between that alarm and payload bay temperatures the incident doesn't reflect anything problematic. During that last few moments of that pass, Jack Lousma reported that the CRT, Cathode Ray Tube, number 1 which is positioned directly in front of the Commander had locked up on him when he was doing some, when he was calling up a display.....

END OF TAPE

CAPCOM Sure looks great.

CAPCOM And Jack, I have an update for your CAP on page 4-119.

SPACECRAFT Okay, I'm looking at it, go ahead.

CAPCOM Okay down at the bottom of the page is a hydraulic thermal conditioning terminate. You may delete that now. We're going to run circ pumps all night and we'll pick this up tomorrow as well as a write in that was an A 12 hydraulic circ pump power 1 to main A. You may delete that as well.

SPACECRAFT Okay I'll delete three lines on the bottom of 1-19 and I do have the write in in there. Thank you.

PAO That was Pilot Gordon Fullerton using a windup spring loaded...

SPACECRAFT ...comments about the glare in this scene.

CAPCOM (laughter) Gordo, you are a terrific mind reader.

SPACECRAFT I count that as a comment.

PAO ...was a windup spring operated rotary blade razor that Col. Fullerton is using presently.

CAPCOM Columbia, Houston. We would like to continue with the RMS troubleshooting that we started earlier and we have only one minute to go here, so if you could be ready to pick that up stateside we'd appreciate it.

SPACECRAFT We'll try to do better next time on that.

CAPCOM We loved it.

SPACECRAFT Okay, that's all there is.

CAPCOM That was great. We'll see you over the states in 3 minutes.

PAO We've had loss of signal through Hawaii and it's difficult to describe the level of delight here in Mission Control Center at Col. Fullerton's reaction to the hairbrush. The affection that the mission control team has for the astronauts is immeasurable in that there was a real reaction of delight in here. Mission Elapsed Time is 6 days 1 hour 45 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, Houston back with you through the states for 19 minutes.

SPACECRAFT Welcome back Steve.

CAPCOM Roger Jack. We're ready to continue the RMS testing we were doing before if you're ready at the aft panel.

SPACECRAFT Standby.

CAPCOM And Jack, once again the game plan is to select the RMS to port and wait 5 seconds and look for that encoder check alarm. And if we get it, reset it via the item 12 and 11 on spec 94. Over.

SPACECRAFT Understand. I'm ready, go ahead.

CAPCOM Okay we're ready for RMS select to port now.

CAPCOM And Jack, we still don't show the RMS selected to port.

SPACECRAFT Roger, never got your last transmission.

CAPCOM Okay, sorry about that. We're ready for port now.

SPACECRAFT Mark, it's in port.

SPACECRAFT Okay we've got a singular and a reach limit, master alarm.

CAPCOM Okay Jack, we'd like you to leave it selected in port for about 15 seconds. We'll call returning to off.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. You can return the RMS select switch to off.

SPACECRAFT RMS select going to off.

SPACECRAFT Mark.

CAPCOM Thank you and that completes the items we want to look at on the RMS Jack. One other thing we have over this pass, at your convenience if you have the time, we've put together a discussion of entry. Various issues such as the forecast weather for tomorrow, the deorbit burn and entry itself and some of the systems impacts on your entry.

SPACECRAFT Okay, why don't you start talking. I'll get something to write on.

CAPCOM Okay and it's nothing critical if you're busy with something else, we can defer this to later, Jack.

SPACECRAFT We're setting up this offset planning routine.

CAPCOM Okay, you call us when you're ready for it then.

SPACECRAFT Okay.

SPACECRAFT Looks like we had good weather today at White Sands and we got your message from this morning and it looks like there's some...

END OF TAPE

PAO the pass over Hawaii should be in the vicinity of 6 and 1/2 minutes. During which Gordon Fullerton will be doing some work for pointing for the SUSIM, a Solar Ultraviolet Spectral Irradiance Monitor. And the crew is about 45 minutes away from their lunch time. And we'll standby for another 4 and 1/2 minutes looking forward to that pass over Hawaii and the video playback of this morning's activities onboard Columbia. At 6 days 1 hour 33 minutes this is Shuttle Mission Control.

TAC COMM control.

Yea, go ahead.

Yea, okay I hear you loud and clear.

Okay yea, we found the problem there.

Okay, good show, thank you.

PAO Shuttle Mission Control. 6 days 1 hour 37 minutes. We've beginning to acquire data from Hawaii. We're just a minute away from that video tape replay. Now acquiring downlink TV. Commander Jack Lousma.

CAPCOM Columbia, Houston through Hawaii for 6 minutes with good video.

PAO VTR dropped out here we'll recover that.

SPACECRAFT We were just looking at it ourselves. He's rewinding and he'll be ready very shortly.

CAPCOM Okay, we'll give you a yell when we're ready.

SPACECRAFT Okay, meanwhile

CAPCOM Okay, we're ready when you are.

PAO Mission Control. See the middeck hatch.

SPACECRAFT Okay Brewster, is it coming down?

CAPCOM Sure is Gordo, got a good picture.

SPACECRAFT Okay, I'm going to try to do a little real time editing. Can you give me an estimate of how many minutes we got to come down to you?

CAPCOM We have 5 and 1/2 minutes.

SPACECRAFT Okay, I'm going to go for awhile here and then fast forward awhile.

CAPCOM Okay.

SPACECRAFT There'll be a break in the middle but just hang with it.

CAPCOM Okay, copy that.

PAO That's the personal hygiene kit onboard the vehicle that Jack Lousma's using at the moment. Using the water jet to liquify some soap.

(Song: Blue Hawaii)

CAPCOM Columbia, Houston, could we have TV switched to command please?

SPACECRAFT Okay, it's in command.

CAPCOM Thank you.

(Rest of song Blue Hawaii)

CAPCOM Columbia Houston, we got a good picture coming down and we heard some great music.

SPACECRAFT (garble)

CAPCOM And we have 1 switch for you to throw if you can on panel L2.

SPACECRAFT Go ahead Brewster.

CAPCOM Roger, N2 system 2 reg inlet to open, talk back open.

SPACECRAFT Okay, that's N2 system 2 reg inlet number 2 open.

CAPCOM Okay, we see it open, thanks a lot Jack.

SPACECRAFT Nothing like show biz, is there Brewster?

CAPCOM Sure looks great.

END OF TAPE

CAPCOM ...seconds LOS. CRT 1 is yours again and Botswana is next in 7 minutes.

SPACECRAFT Okay doke.

CAPCOM Columbia, Houston through Botswana for 5 minutes standing by.

SPACECRAFT Okay, we got you loud and clear.

CAPCOM Roger.

CAPCOM Columbia, Houston. We're 30 seconds to LOS. Yarragadee is next in 13 minutes.

SPACECRAFT Okay we'll see you there. I'm going to work your star trackers for you.

PAO Mission Control Houston. Half a minute away from acquisition of signal through Yarragadee for 6 minutes through the UHF station. Hawaii is about half an hour away and about 25 minutes away and when we go over Hawaii we'll have the downlink of video recording of the personal hygiene activities that took place onboard Columbia this morning in which Jack Lousma referred to earlier as being far superior to the quality of the live video we saw over the United States.

CAPCOM Columbia, Houston through Yarragadee for 6 minutes over.

SPACECRAFT Okay we're hearing you through Yarragadee Brewster. We're in the middle of the RCS hot fire tests. Going very well.

CAPCOM Okay great.

CAPCOM Columbia, Houston. We have no updates for you to the SUSIM offsets. We are 45 seconds LOS. Hawaii is next in 19 minutes and we'll expect to be ready for VTR playback at Hawaii and we'll call you when we're ready to have you key that down.
SPACECRAFT Okay we'll be ready and stand by for your call and I understand no update on the attitude and we're on step 3 page 9-4. And all the jets fired.

CAPCOM Okay that's good news. Thank you.

PAO Mission Control Houston. We've had loss of signal through Yarragadee. We'll acquire Hawaii in about 18 1/2 minutes and we'll look forward to the downlink TV of the recording made earlier this morning of the crew's personal hygiene period. Commander Jack Lousma reported the conclusion of the RCS, reaction control system, hot fire testing has been occurring for

over the Yarragadee pass and reported that all the reaction control system jets fired properly. Mission Elapsed Time 6 days 1 hour 20 minutes. This is Mission Control Houston.

PAO This is Shuttle Mission Control at 6 days 1 hour 31 minutes Mission Elapsed Time. About 6 minutes away from acquisition of signal through Hawaii and the downlink of that video cassette recording taken earlier onboard Columbia this morning. RCS hot fire tests have been concluded. About this time Columbia Pilot Gordon Fullerton is involved in some cabin stowage activities having to do with deploy and entry cue cards, stowing helmets and gloves, window shades, closing out lockers, setting up a 16 mm camera and we'll soon begin meal preparation of the lunch meal for the crew. And meanwhile in advance of the VTR playback, video tape recording playback, Commander Jack Lousma will be involved in a vernier burn by the digital auto pilot B and then subsequently digital auto pilot A. The ...

END OF TAPE

SPACECRAFT Aft main B off?

CAPCOM We'll give you the call Jack.

SPACECRAFT Okay, standing by.

CAPCOM It'll be about 3 minutes at least.

SPACECRAFT Okay.

PAO Mission Control. We lost video and we still have 4 minutes left of voice contact. Position the vehicle and the restricted range of motion in that camera on that RMS elbow location just conspired against making that a more favorable TV pass. Mission Elapsed Time 6 days 29 minutes.

CAPCOM And Columbia, Houston, we're finished with the TV coverage and you can power it down at your leisure.

SPACECRAFT Okay, that was a pretty much a total bust, and we apologize, as we said that.

CAPCOM Well it was just incompatible with our attitude. It's too bad it turned out that way.

SPACECRAFT I did my best to get that elbow camera pointed toward the Earth, and it just went into gimble lock everytime I tried.

CAPCOM Right. We did get some nice pictures though, Gordo.

SPACECRAFT I think we're still better than the original plan Brewster.

CAPCOM That's probably a good bet Jack.

PAO Jack Lousma's referring to the original plan to give a video tour of the Waste Management System.

CAPCOM And Columbia, Houston, we're ready to go off with the payload aft main B and then after 3 minutes back on, and that'll complete the test.

SPACECRAFT Okay, we'll go off and wait 3 minutes, go back on. Thank you.

CAPCOM Columbia, Houston 30 seconds LOS, DAKAR next in 4 minutes.

SPACECRAFT Okay.

CAPCOM Columbia, Houston through DAKAR for 9 minutes, over. Columbia, Houston through DAKAR for 9 minutes, over.

SPACECRAFT Okay we got you at DAKAR.

CAPCOM Roger.

SPACECRAFT Well we may still be smarting about the TV tour over the states there, but wait till you see our playback of the personal hygiene at Hawaii.

CAPCOM We're looking forward to it.

PAO This is Shuttle Mission Control. We're AOS over DAKAR at 6 days 43 minutes. I was just reading off some of the data from the CRTs.

CAPCOM Columbia, Houston could we have a spec 1 on a GNC machine, please.

SPACECRAFT Yes, on a GNC you say?

CAPCOM That's affirmative. Spec 1 onto a GNC for a variable parameters.

SPACECRAFT Allright, you got it, CRT number 1.

CAPCOM Thank you.

PAO Mission Control Houston, they're once again reading off some of the data from the CRTs in here, as we're processing data through Ascension. The Vehicle's orbit is 132.7 by 124.1 nautical miles, velocity 24,450 feet per second, temperature in the flight deck is 87 degrees, humidity 43 percent, cabin pressure is 14.9 pounds per square inch. Columbia's fuel cells are putting out a total of 486 amps and 14.7 kilowatts. Still have contact for about 2 and 1/2 minutes through DAKAR and Ascension. Vehicle just off the coast of west Africa on it's 98th orbit, this is Mission Control at 6 days 45 minutes.

CAPCOM Columbia, Houston we're 30 seconds LOS. CRT...

END OF TAPE

PAO Commander Jack Lousma is doing some switching on the induced environmental contamination monitor package in the payload bay and doing some COAS calibration earlier.

SPACECRAFT Don't know how it's going to work Brewster. Turned out the attitude is not optimum for this work. We'll give it our best.

CAPCOM Okay Gordo.

PAO Columbia now streaking across the United States

SPACECRAFT That omicron is the absolutely the worst, mainly, cause you got the nose placed toward the ground and you can't get any of these cameras to look through the nose of the airplane, that's the basic problem.

CAPCOM Okay, we copy that Gordo.

PAO Gordon Fullerton reporting that the view from camera is not as good as we'd hoped it was going to be. (garble) Columbia arching the central United States on a path that enters at approximately San Diego, California and arcs across the country cuts out around Virginia and Maryland. Vehicle now approximately over Kansas and Missouri area. AOS at MILA and here's the downlink TV.

CAPCOM Gordo, we're receiving a picture now.

SPACECRAFT Okay, basically our groundtrack has brought us in over the coast just between Los Angeles and San Diego and we went about 80 miles north of Phoenix and we just passed up over White Sands, New Mexico. The weather is clear there and also we passed north of Albuquerque but could see White Sands very well. Now we're heading for just about over head Kansas City and over head St. Louis there's kind of cloudy up in this area and it looks like that about Kansas City or St. Louis it's going to clear up again.

CAPCOM Okay, copied that Jack, and we're getting some pretty good pictures. And Jack, 3 minutes has been up, we need the payload aft main B to on.

SPACECRAFT Okay, aft main B is on.

CAPCOM Thank you.

SPACECRAFT We're looking out the over the left wing now and you can see the radiator and some of the interior of the spacecraft, but we can't see to much of the world. Over the left wing, however, looking out the window we can see that we're pointed toward the home state of some of our collegues, Michigan,

and I know that Brewster Shaw is well acquainted there being from (garbled) City.

CAPCOM That's correct Jack.

PAO Mission commander Jack Lousma expressing some of his parochial interests in Michigan, his home state and of course, the home state of the capsule communicator Brewster Shaw.

SPACECRAFT Well, we'd like to be able to show you a little more of the U.S. than we're showing here but unfortunately the weather and the plane angles aren't all that great but about this point in time we're cruising just south of Charleston and Washington D.C. and we're going to coast out at approximately Cape Hatteras around Moorehead City and so forth.

CAPCOM Okay Jack, the pictures look pretty good and thanks a lot for the tour.

SPACECRAFT Okay, we wish it could have been better, I guess if we had a right wing down omicron it would have been perfect. Sorry, we didn't think of that sooner Brewster.

CAPCOM And Jack, 3 minutes has been up again, we can restart the IECM bypass procedure.

SPACECRAFT Yea, going to position 1 for 30 seconds then, right?

CAPCOM That's correct, thank you.

PAO Mission Control. Will be losing this signal in a moment. Elapsed time 6 days 28 minutes.

SPACECRAFT Okay, we're back in position 2 and we want to go back to aft main B off?

END OF TAPE

CAPCOM 11 and then take the RMS select off again and we want to repeat that sequence twice. I'll talk you through it now.

SPACECRAFT Okay, ready to go.

CAPCOM Okay, RMS select to port and watch for the encoder check.

SPACECRAFT Ok, 321 mark. We got a singularity in reach limit which is usual. Let me the check the other messages here.

CAPCOM Okay, if you don't get an encoder check after 5 seconds you can go off and it's then 5 seconds.

SPACECRAFT Well, let's see. I've got too many master lamps to put out, just a minute. We've got an ABE light, an ABE light, which ought to surprise everybody. I don't know what that's about.

CAPCOM Okay, we'd like to turn it off, RMS select off, and then repeat the sequence again, go port for 5 seconds and if you get an encorder check, reset it, and then back off. And we're 15 seconds to LOS. Buckhorn's next in about 4 minutes.

SPACECRAFT I don't think we have gotten an encoder check yet. RMS select on, off.

CAPCOM Okay, we're going to lose data here, Gordo, you may not want to do the rest till later.

SPACECRAFT I think we're trying too much in too short a time here.

CAPCOM Okay.

PAO We have acquisition of sig.....

CAPCOM .... Columbia, Houston through Buckhorn for 19 minutes, over.

SPACECRAFT Okay, loud and clear, do you want us to do this to start this IECM stuff right now, or do you want to go to position 1 for 30 seconds and then 2?

CAPCOM That's affirm Gordo.

PAO Mission Control at 6 days 14 minutes. TV will occur at 6 days 23 minutes. About 9 minutes from now as soon as we acquire the MILA station and we should have video for about 7 minutes. And it is probable that the crew will select the elbow camera and the remote manipulator system color camera and get

some views of the continental United States as

SPACECRAFT Okay, we're in position 2, standing by for your go for payload aft main B off and 3 minute wait.

CAPCOM Okay Jack, we'll give you a call.

SPACECRAFT And all this COAS work get you maneuvering back to attitude kind of late so what I did was increase the DAP a little bit.

CAPCOM Okay, sounds like a good idea. And Jack it's going to be a couple more minutes till we call you on the IECM thing.

SPACECRAFT Okay.

PAO For this pass the camera selected will be the RMS elbow camera. The RMS is, of course, is in the stowed position and there is some range of movement, pan, and sweep, on the camera mount, and the vehicle is top sun, and nose slightly down, so we're not completely confident what kind of view we're going to get of the Earth looking over the looking forward across the flight deck from the camera's elbow position. Now acquiring data through White Sands. 6 days 18 minutes. About 5 minutes away from video.

CAPCOM Columbia Houston, we're ready now for you to go on R1, payload aft main B to off and then wait 3 minutes and go to main B and then wait 3 minutes and repeat.

SPACECRAFT Okay, I'm going payload aft main B off now.

CAPCOM Roger.

PAO Mission Control Houston. Columbia pilot Gordon Fullerton setting up for that TV activation and meanwhile, Commander Jack Lousma is doing some switching on the induced environmental contamination.....

END OF TAPE

CAPCOM The RMS because of the encoder check alarms you got before, if one of you has time to do a couple switches of the aft panel please.

SPACECRAFT We're really busy right now Steve, can we hold on that?

CAPCOM You bet. I will catch you later.

CAPCOM Columbia, Houston 30 seconds LOS now. Next is Hawaii in 17 minutes.

SPACECRAFT Okay, maybe we can do that, your request then. We got all the lights out here and we're trying to get this cal down on time, so we'd compromise that if we started fooling with swtiches.

CAPCOM No problem, sorry to bother you about it.

PAO Shuttle Mission Control. Elapsed Time. 5 days 23 hours 51 minutes, we'll acquire signal again in 14 minutes at Hawaii.

PAO Shuttle Mission Control at 5 days 23 hours 57 minutes. About 9 minutes away from acquisition of signal through Hawaii. As the vehicle comes across the Continental United States on this pass we'll be getting some live downlink TV via the MILA station. And it'll be Earth views from the color elbow camera on the remote manipulator system, and we'll be getting some panoramas of the Continental United States with, plan to have Columbia Pilot Gordon Fullerton narrating that telecast. And that'll be in about 25 minutes from now, as soon as we get within distance of the MILA ground station. We'll pick up voice contact with Hawaii in about 8 and 1/2 minutes. Columbia is now just sweeping up across the South Pacific and the astronauts are about 5 minutes away from seeing a sunrise, as they see every hour and half, they're on orbit 98. Mission Elapsed Time 5 days 23 hours 58 minutes, this is Mission Control Houston.

PAO Six days and 5 minutes, we have AOS Hawaii for about a minute, and a brief keyhole and then pick up again for another 4 minutes.

CAPCOM Columbia, Houston through Hawaii for 3 and 1/2 minutes, over.

SPACECRAFT Your're are in there Brewster, we're just completing our COAS verification, we got all the data.

CAPCOM Okay, that sounds good Jack. And Jack, when you come up stateside there's an IECM bypass survey scheduled, and usually takes a quite a bit of time to get that completed, we'd

like you to be ready to start that as soon as we come up AOS at Buckhorn if you could.

SPACECRAFT Okay, we'll do that.

CAPCOM And Gordo, a comment on the camera work over the states. Since the elbow camera's color, they'd prefer you use that if possible for the most of it.

SPACECRAFT We were thinking of switching around between delta and the elbow.

CAPCOM And Gordo, you can use the camera that gives you the best picture. We think since your going to be in the top sun attiude with the nose pitch down a little bit, that the, maybe the elbow's going to give you better results.

SPACECRAFT Okay, gotcha.

CAPCOM And if one of you can break 3 on panel C3, We'd like the DFI PCM recorder below samp.

SPACECRAFT You got it as you spoke, it was put in low samp.

CAPCOM Thank you much, and the only other thing I've got is the RMS switch throwing, it'll take about 20 seconds.

SPACECRAFT Alright, I'll do that right now.

CAPCOM Okay, back on panel A8L.

SPACECRAFT Alright.

CAPCOM Okay, hold off on throwing it until I describe it to you a little bit, we're going to take the RMS select to port. And then we're going to wait 5 seconds and see if we get an encoder check fault to occur, if it does, we want to reset it on spec 94 by an item 12 followed by an item 11. And then.....

END OF TAPE

PAO This is Shuttle Mission Control at 5 days 23 hours 18 minutes. We're in a loss of signal period on orbit 97 the vehicle's just right over the heart of Africa. In daylight just a few minutes away from crossing the terminal into darkness. And the next contact will be through Yarragadee, UHF station at that location. And acquisition of signal there in approximately 20 minutes. This is Mission Control Houston.

CAPCOM Columbia, Houston through Yarragdee for 6 minutes, over.

SPACECRAFT Okay, we hear you at Yarragadee, we've got our first star, and we're manuevering to the second attitude, then we're asking for the mid point of darkness and the longitude and time of the next ascending node, please.

CAPCOM Okay Jack, the mid point of darkness is at 2346.

SPACECRAFT Okay, 2346. Okay, and we'd like to set up our slider map very accurately and so we're asking for the next ascending node data, please Steve.

CAPCOM In work.

SPACECRAFT And Steve, we got some suggestions for you to consider, over.

CAPCOM We're ready to copy.

SPACECRAFT Looking ahead to this live TV pass, which shows that WCS explanation, seems highly appropriate for a Sunday morning, what we would propose to substitute do, would be a live aerial tour across the United States and using the elbow and the D camera and switching from one to the other and picking out targets and commenting as they go by, that's why we want to get maps set up real accurately and I wonder what you think about that as a real time substitute?

CAPCOM Okay, Gordo, we think that's a great idea.

SPACECRAFT Okay, we've been only had kinda brief look at the weather situation, cause we're pretty busy on that last time across, but we noticed we did see the ground here and there and you might have a look at your satellite view there and see how this particular ground track's gonna look.

CAPCOM Wilco, stand by one. And Columbia, Houston, I have the longitude and time of your next ascending node if your ready to copy.

SPACECRAFT Go ahead.

CAPCOM Longitude is 170.94 West, time is 000214, over.

SPACECRAFT Okay, 170.94 West, and 214, thank you Steve very much.

CAPCOM And Columbia, Houston a minute and a half LOS, while we're checking the weather for you, I have a switch on Panel L10 of the OSS-1 tape recorder if you have a moment.

SPACECRAFT Okay go ahead Steve.

CAPCOM Roger. OSS-1 TR1 track select to 18, one eight.

SPACECRAFT Okay, it's at one eight and it's counted down to 3 monitor level.

CAPCOM Copy 3 , thank you.

SPACECRAFT Will the .03 angle error be acceptable?

CAPCOM Read what?

SPACECRAFT Just barely missed the bulls eye a little bit there, but I guess we're going to buy that one.

CAPCOM Roger that, it's good, 5 seconds LOS, pick you at Orroral in about 2 minutes.

SPACECRAFT Okay.

CAPCOM Columbia, Houston through Orroral for 3 minutes, over.

SPACECRAFT Okay, we're still working on the verification.

CAPCOM Roger. Columbia, Houston we'd like the primary RJDs off please.

SPACECRAFT Okay, we forgot about that didn't we?

CAPCOM And Columbia, Houston, we've got a little trouble shooting on the RMS because of the encoder check.

END OF TAPE

CAPCOM And Columbia Houston, confirm you had secured from the water dump Jack?

SPACECRAFT That's affirm, we secured the water dump about the time you were talking about it. It's tank A 36 percent.

CAPCOM Thank you.

SPACECRAFT Yes sir. We will put the DFI PCM to high sample at this time. Was that correct, high sample?

CAPCOM That is correct, high sample Gordo.

SPACECRAFT Okay, it is. And Steve while we got a couple minutes here. We know this is Sunday morning and people across the land and around the world are worshipping in their respective ways and we just want to say we appreciate the prayers and support that everybody has made and given for the safety and success of this flight and while we're not there to worship with them physically we are worshipping with them in spirit from this unique vantage point.

CAPCOM Okay, thank you very much Jack.

SPACECRAFT And particularly we want to remember our churches respectively Clear Lake City and in Friendswood to tell the people there we particularly appreciate their prayerful, helpful support over this time and I guess if there's any message that I would want to pass along is the one that's found in Proverbs 3 verses 5 and 6 where we have 3 recommendations and a promise. It says "trust in the Lord with all your heart, cleave not unto your own understanding, and in all your ways acknowledge him and he will direct your paths" and I believe that is true.

CAPCOM Thank you Jack.

SPACECRAFT And Steve, if you get somebody down there who knows the mid point of darkness for this course verification test, I'd like to write it down so we make sure we get that one mark right on the money.

CAPCOM Okay, 20 seconds LOS, we're getting that for you, next is Yarragadee in about 29 minutes Jack.

SPACECRAFT Okay thank you Steve.

END OF TAPE

PAO ...degrees, 276 degrees. The bearings okay and looks like we got a good APU.

CAPCOM Columbia, Houston. You're go for a shutdown of APU 3, it looks good.

SPACECRAFT Oh, it sure does. Okay I'm going to shut down 3.

PAO In the words of Flight Director Harold Draughon, outstanding. Certified APU 3 the water boilers A and B effectively stabilize the temperatures on that auxillary power unit.

SPACECRAFT The APU shutdown's complete.

CAPCOM Copy.

SPACECRAFT ...go over (garbled) again.

PAO Crew reports and data confirms that they're shutting down APU 3.

CAPCOM Roger, go for verniers Jack.

CAPCOM Okay we're back on vernier jets.

PAO GNC reports the Flight Director nominal tests of the body flap during that APU...

CAPCOM Columbia, Houston, reminder you need to return the DFI recorder, PCM recorder to high sample 15 minutes after APU shutdown, over.

SPACECRAFT Okay, we'll make it at 15 minutes. That will be approximately 08.

CAPCOM Roger.

CAPCOM And Columbia, Houston. Your water dump will be complete in 1 or 2 minutes and you can secure from that on time, and a reminder for APU 3 to return the boiler heater to A.

SPACECRAFT Okay. I'll put it there right now.

SPACECRAFT At leisure Steve, out of curiosity, when do we get the APU controller power back off. It's here somewhere but I can't find it.

CAPCOM We believe the procedure is on about 3-11. Take care of that Gordo. We'll check.

SPACECRAFT It's on page 3-19 of deorbit prep. Are you going

to go to DAKAR on a later pass to do that.

CAPCOM We're with you now and we'll give you the call on that Gordo.

SPACECRAFT Okay, because I won't remember to back in this book.

CAPCOM That's affirm. We'll remind you on that.

CAPCOM Columbia, Houston. 30 seconds LOS. The water dump is complete now and you can secure from that. Next is DAKAR in 6 1/2 minutes. Over.

SPACECRAFT Okay. We got the tone for that and I'm back here in the process and putting up the coax.

CAPCOM Okay good show on the FCS checkout.

SPACECRAFT It's getting better. I'm glad, I didn't (garbled) that's work. Who ever did it.

PAO This is Mission Control Houston. We had loss of signal at Mission Elapsed Time 5 days 22 hours 59 minutes. Acquire again in 5 1/2 minutes over DAKAR on the west coast of Africa for a pass of about 5 minutes duration. Flight control system checkout went real well and just affirms the good feeling that the flight control team has concerning entry tomorrow and of course, the checkout APU 3 went splendidly and affirms our confidence in that auxillary power unit and verifies we'll have three good APUs for entry tomorrow.

CAPCOM Columbia, Houston through DAKAR for 5 minutes, over.

SPACECRAFT You're broken on that one Steve. Say again please.

CAPCOM Roger Jack we have you through DAKAR for 4 1/2 minutes over.

SPACECRAFT Roger at DAKAR, thank you.

SPACECRAFT And is the maneuver or the attitude for the COAS verification test still good Steve?

CAPCOM Roger. We believe it is Jack.

SPACECRAFT Okay.

END OF TAPE

SPACECRAFT Okay we started the aero surface drive.

CAPCOM Roger. Columbia, Houston. The landing gear isol valve configuration is good as is, over.

SPACECRAFT Okay.

PAO Bearing temperature 170 oil temperature 130. Temperature still coming up. EECOM reports the oil return temperature to 169, 171 now from 69 degrees from where it was started, when it was started. Bearing temperatures in the 190s approaching 200. Temperatures are steadily climbing. Bearing temperature's just over 200 degrees, oil temperatures 170, 180. Mission Control oil tempertures they think are going to up beyond 250, 260 degrees to verify the operation of controller A controller B water spray boilers in that APU. Bearing temperature 233 oil temperature's 212. Bearing temperature 247, oil temperature.....

SPACECRAFT We're down to APU shutdown call out and we'll leave it run to complete the test, but basically the APU sensor actuator check is complete. We noticed that when we went back to auto after reseting the panels, that sometimes we'd get a momentary set of arrows on their channel 3, but then they went away.

CAPCOM We copy that Jack, and we'll just leave it running here a bit. And watch the temperatures.

SPACECRAFT Okay, we got 540 (garble) time at this time.

CAPCOM Copy 540. And Jack, we believe those mometary down arrows are characteristic of that brake before make flight control switches, it was no anomaly, over.

PAO Mission Control, those down arrows indicating that the temperatures and pressures had decreased which of course is not what you expect when your running up those.

SPACECRAFT (garble) is working.

CAPCOM And we're just coming up to that temperature now, and if you didn't copy before, the momentary down arrows were to be expected as a characteristic of the FCS switches, they're brake before make switches Gordo.

SPACECRAFT Okay, thank you. Another characteristic is one heck of a jolt, everytime he (garble).

PAO Mission Control, oil temps now 215, 260, and the water spray boiler should be kicking in pretty soon and reducing those temperatures. Bearing temperatures 281, 271. Water spray

boilers are now activated, temperatures are stabilizing, beginning to stabilize. Bearing temperatures are 287, 271, oil temperatures 253, 270.

CAPCOM Columbia, Houston now we need the DFI PCM recorder now to continuous record, over.

SPACECRAFT You got it gray. It's got a message, I think it might be the vent temp on APU water boiler number 1 going off again. The auto limit's high.

CAPCOM That's affirm Gordo, because of a heater we turned on.

SPACECRAFT Roger.

CAPCOM And we've seen enough on A, we're ready to switch on boiler controller water heater 3 to Bravo, over.

SPACECRAFT Okay, boiler controller water heater 3 going to Bravo, (garble).

PAO Switched over to water boiler B, Bravo. Water boiler A had adequately stabilized the temperatures. (garble) APU number 3's been burning for about 9 and 1/2 minutes now, and oil temps appear to be stabilized, right in the vicinity of 255 degrees...

END OF TAPE

CAPCOM .... to see the FCS checkout part 1 accomplished over the states, so you can go through the preps for part 1 up through waiting for the MCC go. I would like to see you accomplish that fairly shortly before coming AOS at the states so you stay on the vernier jets while you're LOS most of the time. And as a reference, the time we'll pick you up at Buckhorn will be 2241.

SPACECRAFT Okay, 2241, and we'll be up to the MCC go by then.

CAPCOM Sounds good.

CAPCOM And Columbia, Houston, 30 seconds LOS now. Next is Buckhorn in 24 minutes.

SPACECRAFT Okay, we'll see you in 24.

PAO This is Mission Control Houston at 5 days 22 hours 18 minutes. Loss of signal through Orroral Valley. We'll acquire Buckhorn again in about 23 and 1/2 minutes and the crew of the flight control team advised the crew to perform the checkout on APU 3 over the continental United States so we can get real time look at the data and we'll see that in the Mission Control Center here and report the temperatures that are indicated on APU 3. Meanwhile, the crew is performing the other associated flight control system checkouts of switches and controllers associated with the flight control system. They're verifying their readiness for entry and landing tomorrow. 5 hours, twenty, 5 days 22 hours 18 minutes this is Shuttle Mission Control. Mission Control Houston at 5 days 22 hours 39 minutes. Coming up in 2 minutes for acquisition of signal over the continental United States and we're going to be looking at that test of APU 3. Once again, APU 3 is the unit which overheated during the ascent and was shut down prematurely earlier than we expected shutdown by the crew upon the advice of the flight control team. And the checkout procedure for this today is essentially to verify that the unit is serviceable for entry tomorrow. We'll be watching temperatures in the gear box, the temperature the nominal temperatures we expect are nominal temperatures that we expect to see are right in the vicinity of 230 degrees for oil temperature and 270 degrees for bearing temperature and we'll be looking at those numbers and calling them out to you during the test as we read downlink data here in the Mission Control Center. Acquisition of signal in about 1/2 minute.

SPACECRAFT Okay, Houston, how do you read at Buckhorn?

CAPCOM Columbia, Houston through Buckhorn. Got you 5 by.

SPACECRAFT Okay, we're in phase 3-10. All of part 2 went normally. We're down to getting you a go for APU start.

CAPCOM Roger, standby, Jack.

SPACECRAFT And we are still in vernier jets.

CAPCOM Columbia, Houston, select normal jets and you are go for APU 3 start.

SPACECRAFT Okay, we're B out of normal and we're go for start, thank you.

PAO This is Mission Control, once again to advise you, the temperatures we're looking for, oil temperatures of 230 degrees, bearing temperatures about 270. Okay, data shows the APU's have started, and are running up. Temperatures beginning to come up, bearing temperatures are about 120, oil temps not quite a IDO yet.

CAPCOM Columbia, Houston, check the DFI PP recorder off, O F F

SPACECRAFT Are they off now?

CAPCOM Correction on that, high sample Gordo.

SPACECRAFT Okay, high sample, how about the landing gear hydraulic ISO valve. The checklist says close, I notice here, and it's open where we last left it.

CAPCOM Standby Gordo.

SPACECRAFT Okay, we started the aerosurface drive.

CAPCOM Roger. Columbia, Houston, the landing gear ISO valve configuration is good as...

END OF TAPE

CAPCOM ...that when you do the aero surface drive check, which is in page 3-11 of your PDP, normally as you remember says to do that for 5 seconds, we would like to increase that to 30 seconds. It'll give us a better look at the cycling and we are running the APU for a longer period of time anyhow, over.

SPACECRAFT Okay, I want to do this aero surface drive for 30 seconds, you going to call it when your happy or should we time it?

CAPCOM You can just time it on your own and terminate at 30 seconds Gordo.

SPACECRAFT Okay, give me the page so I can write that down. So I don't have to search it.

CAPCOM Okay the page reference in the PDP Deorbit Prep is 3-11.

SPACECRAFT Okay, we got it.

CAPCOM Thank you, and the only other thing I have is we would like you to cycle the Y star tracker shutter please, over.

SPACECRAFT Okay Steve.

CAPCOM Columbia, Houston, we're 30 seconds LOS now. Gordo, on the PGU light switch you were talking about earlier, that is no problem. They are quite happy with the data.

SPACECRAFT I think we cut out, we lost you, say again.

CAPCOM Roger, we're 20 seconds LOS. The PGU light switch configuration caused absolutely no problems for the PGU folks. And next is Yarragadee in 10 minutes.

PAO This is Mission Control Houston at 5 days 21 hours 57 minutes. Had a loss of signal through Indian Ocean, reacquire again in just under 8 minutes through Yarragadee, the UHF station there. Columbia on it's 96th orbit of the Earth. Coming up on some significant activity in the crew activity plan, pretaining to the check out of the flight control system which will be modified from the basic crew activity plan this morning to include check out of auxillary power unit 3, the bulky power unit which over heated then was shut down earlier during the ascent portion of launch Monday morning. The heater will be, the heating system associated, the 2 heating systems, A and B associated with that auxillary power unit will be tested during the flight control system check out portion of the flight plan. Mission Elapsed Time 5 days 21 hours 58 minutes, this is Shuttle Mission Control.

CAPCOM Columbia, Houston through Yarragadee for 6 and 1/2 minutes, over.

SPACECRAFT Okay, through Yarragadee. We're in the sensor high test. Page 3-13, checking through the criteria here.

CAPCOM Copy.

CAPCOM Columbia, Houston 20 seconds to LOS, we'll pick you up next at Orroral in 2 minutes.

SPACECRAFT Okay Steve, we just stopped at page 3-15. Everything is looking good so far.

CAPCOM That's good news.

PAO This is Mission Control Houston at 5 days 22 hours 12 minutes. We've got a brief LOS period as we go from the UHF station at Yarragadee to the S-Band at Orroral Valley. Reacquire again in a minute.

CAPCOM Columbia, Houston through Orroral for 4 minutes, over.

SPACECRAFT Okay, we're hearing you at Orroral. We're in the control switch test. Everything is going well so far.

CAPCOM Sounds good Jack. Columbia, Houston a minute and a half to go here. Got a couple of comments before we go over the hill.

SPACECRAFT Go ahead with them.

CAPCOM Roger Jack, we'll be starting voice record from now on. And also, we would like to see the FCS checkout.

END OF TAPE

CAPCOM tell you to hold the vernier push button and that's why we're turning on all the big drivers before you do the transitions, so you won't get any fault messages there.

SPACECRAFT Okay, that's good (garble) thank you.

CAPCOM And you can reference message 45 Charley relative to the operation of the number 3 water spray boiler and APU.

SPACECRAFT Yea, we got that right in front of us here.

CAPCOM Okay, great, we should be all uptight then.

SPACECRAFT By the way, our compliments on the teleprinter messages. They're very concise and clear, and just right.

CAPCOM The ascent team's doing a real great job on the sleep shift. And Columbia, CRRT 1 is yours again.

SPACECRAFT Okay. Brewster, you might check fuel cell purge. It started out at 2110.

CAPCOM Okay, we'll do that Jack. And it looked okay. Columbia Houston, 30 seconds LOS. Madrid next in 6 minutes.

SPACECRAFT Yes sir, we'll see you at Madrid Richard.

CAPCOM Roger.

PAO Shuttle Mission Control at 5 days 21 hours 25 minutes. Loss of signal has occurred and we will reestablish contact in about 4 and 1/2 minutes. Through Madrid during that last pass one of the more interesting remarks was Gordon Fullerton's discussion of the switch for the plant growth unit which he had discovered improperly configured and invites the supposition that he may have accidently bumped it with his knee which is not an uncommon problem in zero gravity as the astronauts enjoy increased mobility and the capability to float around in the cabin with the we've discovered during Skylab and the earlier Shuttle missions that it's not at all extraordinary for one to accidentallly kick or bump into a switch improperly, and thereby improperly configure it, and inaccordingly, many of the switches and controls onboard the vehicle are equipped with guards and shrouds to prevent that, to preclude that from happening. The switch in question is one which controls illumination timing to the plant growth unit which is the experiment which attempts to correlate the relationship between levels of moisture and the rate of growth of some sunflower seeds onboard the vehicle and the purpose of gathering data for use in later Spacelab missions. Acquire signal again in about 3 minutes. Mission elapsed time now 5 days 21 hours 27 minutes this is Mission Control Houston.

CAPCOM Columbia, Houston through Madrid for 5 and 1/2 minutes, over.

SPACECRAFT Okay, we got you, we're just making sure that we got all the teleprinter updates in the book.

CAPCOM Okay. Columbia, Houston, we're 20 seconds LOS. Indian Ocean is next in 12 minutes.

SPACECRAFT Okay, Brewster.

PAO Shuttle Mission Control. Loss of signal through Madrid at 5 days 21 hours 37 minutes. Reacquire again in about 10 and 1/2 minutes through Indian Ocean.

END OF TAPE

.33, excuse me, all the IMU 2's were minuses, all the IMU 1's were plus.

SPACECRAFT IMU 3 was minus .13 plus .05 plus .4 nineredOver.

CAPCOM Okay. Copy all that Jack, thanks alot.

SPACECRAFT Yes sir. Here comes some PGU numbers Richard.

CAPCOM Go ahead.

SPACECRAFT Okay at 5 hours, 5 days rather, 2023, a power light was on and cameras were reading 23.6, 23.7, 23.6, 23.7, 23.9 and 24.2. The temp warning light was off, lamp status was off, and record follow light off. And I've got another note, about something that happened last night on the PGU.

CAPCOM Okay we copy all so far, go ahead.

SPACECRAFT Okay last night at 10:24, I was fiddling around down here fixing dinner or something, and I'm not sure why, but I just happen to notice that the lamp operate mode switch was in ON. As I understood at the time and there wasn't any good sight path to ask for sure then, that when it first appeared to me, it should be in T, so that the automatic timer will turn the lamp on and off and the only thing I can say is I must have bumped it with my knee, it's in a bad spot because when you latch your foot under here, your knee just about comes under the switch. And I checked back I really think that it was bumped in the arm position during an arm cycle and that I caught it and put it back to T before the next off cycle and I really don't think we interrupted the lamp cycle at all. But I thought I'd better report it.

CAPCOM Okay we copy, thank you Gordo. Could we have a GNC spec 1 for some very variable parameters?

SPACECRAFT Yea CRT 1 Brewster.

CAPCOM Okay, I see that Jack, thank you, and I have a water dump numbers for you.

SPACECRAFT Okay, go ahead.

CAPCOM Roger, tank B to 0 and tank alpha to 40 percent, 40 percent.

SPACECRAFT Okay, you want to dump tank B and alpha all the way down to 40.

CAPCOM That's affirmative, and hopefully that will preclude needing a dump tonight.

SPACECRAFT Okay.

CAPCOM And Jack, I have some words about the overall game plan for the STS checkout today.

SPACECRAFT Okay, go to game plan.

CAPCOM Okay, as the CAP update noted we plan to start the STS part 2 early and when we get to the states we will stop part 2 wherever we are and do part 1 so we can have coverage over the states with it. Then when that's complete we'll go back and finish up any of part 2 that remains, over.

SPACECRAFT Okay, generally we want to start part 2 early. We'll interrupt it for part 1 for the states then go back and finish it up.

CAPCOM Okay, that's a good copy and we're going to use AP number 3 for part 1. And Jack, another comment.

SPACECRAFT Okay, go ahead Brewster.

CAPCOM Roger, prior to the OPS 8 transition at 22 hours w need to turn on all the RJ, the primary drivers, and then when w get into the checkouts we'll use the vernier jets that would be DAP A auto vernier for the part 2 of the checkout and the primar jets, that would be, B auto norm for part 1 of the checkout, over.

SPACECRAFT Okay, part 1's going to be B auto normal but part 2's going to be vernier. Say B auto vernier or A auto vernier?

CAPCOM That would be A auto vernier.

SPACECRAFT Okay.

CAPCOM And on the transition, Jack, the CAP does not tell you to hold the vernier

END OF TAPE

SPACECRAFT Alright Brewster, we'll see you there.

CAPCOM Roger. Columbia Houston through Yarragadee for 7 minutes standing by. Columiba Houston through Yarragadee for 7 minutes standying by, over. Columbia Houston through Yarragadee 4 minutes left, could we have a radio check please.

PAO This is shuttle mission control. No communication through the UHF station at Yarragadee. The integrated systems and communications officer is checking the configuration of the ground site, and it is a meal period onboard Columbia at this point, and really don't expect an extrodinary amount of dialogue from the crew here.

CAPCOM Columbia Houston.

SPACECRAFT Hello Houston, how do you read?

CAPCOM Hello Columbia, read you fine by now.

SPACECRAFT Okay, we've been hearing all your UHF calls, but the downlink's interrupted somewhere, are you still coming through Yarragadee?

CAPCOM That's affirmative.

SPACECRAFT Well ah, I don't know what happened. (garbled) I guess got to work on it here.

CAPCOM Okay, and we're working on the ground system. Columbia Houston we're 30 seconds LOS we'll try Orroral Valley i a couple of minutes.

SPACECRAFT Okay, Brewster. See you there.

CAPCOM Columbia Houston through Orroral Valley for 3 and half minutes, over.

SPACECRAFT Okay, fine and square Brewster, how me?

CAPCOM Sounds much better this time Jack.

SPACECRAFT Okay, star tracker working okay for you there and so forth.

CAPCOM We'll look at it. Columbia Houston, star trackers look like they're both operating properly.

SPACECRAFT Okay, that's good, thank you Brewster.

CAPCOM Yes sir. Columbia Houston, we're 20 seconds LOS, Mila is next in half an hour.

SPACECRAFT Okay, Brewster, MILA in 30.

CAPCOM See you there.

PAO Shuttle mission control, loss of signal through Orroral has occurred at 5 days, 20 hours, 44 minutes. Still in the meal period onboard Columbia, although the crew activity plan shows a maneuvered to proper attitude for aligning the inertial measurement units onboard the vehicle. And crew activity is beginning to pick up again fairly briskly in about 15 or 20 minutes, at the conclusion of the meal period. Columbia on its 96th orbit of the Earth. 26 minutes till acquisition of signal through Mila station. Shuttle mission elapsed time is 5 days, 20 hours, 45 minutes. This is mission control Houston.

CAPCOM Columbia Houston through Mila for 11 minutes, over.

SPACECRAFT Okay, that's loud and clear, we got the tile pressures tied up for you there. In the IMU alignment, Ed, we're getting back to top sun.

CAPCOM Okay, sounds good, and we'll take the results from that one whenever you have them ready.

SPACECRAFT Okay, dark at 210211, and IMU 1 said +.01, .05, .27. IMU 2 said -.21, 2.07, .33,

END OF TAPE

Madrid, this is Mission Control Houston.

CAPCOM Columbia, Houston. We're 30 seconds LOS. Indian Ocean is next in 12 minutes, enjoy your breakfast.

SPACECRAFT Okay Brewster, thanks very much. We'll do that.

PAO This is Shuttle Mission Control at 5 days 20 hours 3 minutes into this flight. We've had loss of signal through Madrid. We'll reacquire again in about 11 minutes through Indian Ocean Station.

SPACECRAFT Houston, are you still there.

CAPCOM That's affirmative.

SPACECRAFT Do we need to check point the morning?

CAPCOM Negative.

SPACECRAFT Okay. We won't do it.

PAO Shuttle Mission Control. We were supposed to be LOS, but just got a little extra time in that pass through the elevation through Madrid. Neil Hutchinson is Lead Flight Director for this mission for STS-1 and STS-2 he was Flight Director of the ascent team which controls the vehicle through the launch and ascent portion of the mission and for STS-3 is Flight Director for Orbit Phases and again is Lead Flight Director which gives him additional responsibilities for certain planning, management and leadership activities during the flight. During his change of shift briefing last night, Mr. Hutchinson was asked to give a summary and assessment of the success level accomplished during this mission. In his response to that question fairly succinctly summarizes the motions and feelings of the flight control team and much of the management here at Johnson Space Center and bears repeating. I'd like to take this opportunity to read part of his remarks. Mr. Hutchinson said, "I'm sure it appears that we have a little problem with the S-band COMM and the television cameras and everything and that we've had a bunch of things nipping at our heels it seems all the way along, but if you put it into context of the fact that we appear to be going to our full duration here, we've better than doubled the total amount of time in space that we have on this vehicle. We have gotten some outstanding performance out of the systems working against one of the tougher tests we had in the program which other than just getting up and getting down which were those long thermal cold and heat soaks, the arm has performed impeccably. We got another really big first by picking up and putting down a payload several times, and doing that without the aide of all the devices that we would have liked to have had at our disposal. I think the thing has just

been a tremendous success." Those remarks again from Lead Flight Director Neil Hutchinson. Mission Elapsed Time 5 days 20 hours 6 minutes AOS in about 9 minutes through Indian Ocean Station. This is Shuttle Mission Control.

PAO Mission Control at 5 days 20 hours 14 minutes acquisition of signal through the Indian Ocean Station in about 1/2 minute, be for a pass of 6 minutes at a maximum elevation of 6.6 degrees.

CAPCOM Columbia, Houston through Indian Ocean for 5 1/2 minutes. Over.

SPACECRAFT Okay we got you at Indian Ocean Brewster.

CAPCOM Okay Jack.

SPACECRAFT I had scrambled eggs, sausage, breakfast roll, orange juice, diet peaches and granola. How's that sound.

CAPCOM Boy that sounds good.

SPACECRAFT Except for the granola right?

CAPCOM Personal preference.

PAO This is Shuttle Control 5 days 20 hours 16 minutes. Columbia Pilot Gordon Fullerton with some nutritional advice for you boys and girls who want to grow up to be astronauts. Their reporting on the breakfast menu onboard the vehicle.

CAPCOM Columbia, Houston. 30 seconds LOS. Yarragadee is next in 9 minutes.

SPACECRAFT All right Brewster, we'll see you there.

END OF TAPE

(MUSIC)

PAO This is Shuttle Mission Control at 5 days, 19 hours, 51 minutes. We've had a loss of signal. We'll reacquire again in 5 minutes through Dakar. Exchange of music this morning between the ground and the Columbia, the Columbia playing for the flight control team, I'm Sitting On Top of the World and the flight team transmitting up Those Magnificent Men and Their Flying Machines. Crew's still involved in the post sleep activity and preparing for breakfast, instructed to turn on the star trackers, which was in the crew activity plan is one of the earliest tasks of the day and CAPCOM Brewster Shaw reminding them of that. Activities for today are pretty much as planned in the crew activity plan with the addition of preparations and plans to start APU Number 3 this morning during the flight control system checkout period of the flight plan. APU 3 was the system which overheated and was shut off prematurely during the launch on Monday morning and there's a procedure already onboard to run it a little extra length of time to verify both Controller A, and Controller B in the water spray boiler in that APU and right now tha's the only extraordinary event that's planned in the crew activity plan for today other than as was published. Have acquisiton of signal in a little under 3 minutes at 5 days, 19 hours, 53 minutes. This is Shuttle Mission Control.

PAO Shuttle Mission Control. Let me correct something. I'd said that the next contact would be through Dakar when in fact it will be through Madrid in less than 2 minutes now. Additionally, the crew has been instructed to delete all further plasma diagnostic package activity due to the recorder onboard approaching the end of the tape and not complete the PDP tasks for this flight. One electrophoresis sample will be taken during the day after which the crew will disassemble the electrophoresis equipment, which constitutes the end of that experiment as well. Voice contact expected in about a minute through Madrid. Shuttle Mission Control.

CAPCOM Columbia Houston through Madrid for 6 minutes. Over.

SPACECRAFT Okay. We hear you through Madrid. We're about to wrap up our little hygiene (garble).

CAPCOM Okay. That sounds good and when you have a minute give me a yell. I've got a note or two for you.

PAO Shutte Mission Control. Five days, 19 hours, 58 minutes.

SPACECRAFT Go ahead Brewster.

CAPCOM Say again Jack.

SPACECRAFT Ah, I thought you had something for us. I'm sorry

CAPCOM Yes I do. One comment. We're not recording voice now. We won't be for a couple of hours. We'll tell you when we are. We need a GNC IL reset for the star trackers.

SPACECRAFT Okay.

CAPCOM And we need one switch thrown on Panel A-11 when you have a chance.

SPACECRAFT Go ahead with the switch (garble) Brewster.

CAPCOM Okay. On Panel A-11, cryo tank 4 heaters, H-2 BRAVO to off.

SPACECRAFT (garble) cryo tank H-4, cryo tank 4 heater to H-2 BRAVO is off.

CAPCOM Okay. That's fine Jack, and that's because we're seeing some stratification in that tank and we just want to get little heat out of it.

SPACECRAFT Okay

CAPCOM That's all we've got for now.

PAO This is Mission Control Houston. Jack Lousma's comments about the video taping the personal hygiene activities this morning pertains to an activity that is going to be transmitted to us through video tape replay at about 11:30 this morning, Central Standard Time. 10:23 this morning, Central Standard Time, we'll get video tape downlink of some waste management facility activity. Still have 2-1/2 minutes remainin in this pass through Madrid.

END OF TAPE

PAO This is Shuttle Mission Control at 5 days 19 hours 40 minutes. Just a few seconds away from acquisition of signal at Mila. We expect our first voice contact of flight day 6 with astronauts Lousma and Fullerton.

CAPCOM Columbia Houston through Mila for 10 minutes. Over.

SPACECRAFT Top of the morning to you Brewster. How's everybody down there?

CAPCOM Well everyone's just fine. We weren't able to hear you over Orroral. Had us worried there for a moment.

SPACECRAFT I guess that's good, we didn't hear you. We're on the wrong config. or something. You're all clear now though.

CAPCOM Okay that's fine.

SPACECRAFT Thought you were giving us a couple extra winks there.

CAPCOM Well that's a good idea.

SPACECRAFT Right now I'm in the process of making this production of personal hygiene for later playback.

CAPCOM Okay.

SPACECRAFT We'll Brewster, how are you doing this morning?

CAPCOM Just fine Jack, how are you?

SPACECRAFT I'm relieved that...

CAPCOM Columbia Houston you may delete the SM check point this morning.

SPACECRAFT Okay we'll do that. That's what I'm doing Earl, hold it up a little bit. Okay we'll do that Brewster, I was talking to Gordo and he's doing his thing here.

CAPCOM Okay sorry to interrupt.

SPACECRAFT Are you still there Brewster?

CAPCOM Yes sir.

music "I'm Sitting on Top of the World"

SPACECRAFT Did that come through all right Brewster?

CAPCOM Yes sir it sure did. And I bet you guys feel that way for sure.

SPACECRAFT You're right.

CAPCOM Columbia Houston, I need to get the star trackers up before breakfast.

SPACECRAFT Say again please, Brewster.

CAPCOM I need to get the star trackers powered up before breakfast.

SPACECRAFT Oh yes. I'll do it right now. Thank you. I forgot to turn them off last night didn't I.

Musical Interlude.

END OF TAPE

CAPCOM Good morning men of Columbia, your flying machine is every bit as sound as you left it last night.

CAPCOM Columbia Houston, over.

PAO This is shuttle mission control, they suspect thei problems of the ground sight at Auroral Valley. 5 days, 18 hours, 7 minutes. Integrated systems and communications officer believes that we do have good uplink of voice to the vehicle and we are getting downlink data now.

CAPCOM Columbia Houston, how do read, over.

CAPCOM Columbia Houston, we're one minute LOS, how do you read, over.

CAPCOM Columbia Houston, in the blind, your CAP update is onboard, we are 20 seconds LOS, we'll see you over Mila in 30 mintues.

PAO This is shuttle mission control at 5 days, 19 hours, 10 minutes. We're out of range of the Auroral Valley station now, and we'll reacquire in 30 minutes, through Mila. N voice contact that time, the integrated systems and communications officer express the opinion that there was some problem with the ground site at Auroral, and believe that we did get good voice uplink to the crew and we did get some telemetry down through Auroral and the INCO said that there was some activity onboard that he could determine that the crew was manipulating the CRTs, cathode ray tube displays onboard and tha they had begun some of their post sleep activity. Notably, adjusting the duration of the tones, or the caution and warning alarms that are set during the night. Those tones during the night are adjusted to last a little longer to assure that the crew has the opportunity to hear those things when they're asleep. And during the daytime they're adjusted to a much shorter duration just to attract their attention and part of the presleep and postsleep activity is to make those adjustments to those tones as well as configure cabin lighting and set window shades and make other alarm and cathode ray tube configuration adjustments onboard the vehicle and again the INCO has indicated that some of those activities were going on this morning althoug we didn't get any voice downlink from the crew. And this begins the Columbia's 6th day in space on its third voyage. We're on orbit 95, have acquisition of signal in 28 minutes at 5 days, 19 hours, 12 minutes. This is shuttle mission control.

PAO This is shuttle mission control at 5 days, 19 hours, 40 minutes, just a few seconds away from acquisition of signal at Mila. We expect our first voice contact of flight day 6, with astronauts Lousma and Fullerton.
End of tape.

PAO ...and the period of the orbit, that is how long it takes it to complete 1 orbit, is 1 hour, 29 minutes, and 17 seconds. Most of the teleprinter messages have been completed and will be shipped up to Columbia about the time the crew wakes up so that they may begin reading those in their post sleep activity period and while they are preparing their meal. Five days, 17 hours, 1 minute mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston. Five days, 18 hours mission elapsed time. We're on orbit number 93 and just about to reach the starting point of orbit number 94 over South America. The new flight control team is coming onboard now and the handover period is starting in just a few minutes, and just a reminder that the change of shift briefing with the offgoing Ivory Flight Control Team will begin at approximately 5:30 a.m. Central Time in Room 135 of Building 2. Five days, 18 hours mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston. Five days, 18 hours, 29 minutes mission elapsed time on orbit number 94. We just had a pass over the Madrid tracking station where some of the teleprinter messages were sent up to Columbia. While we were making that pass, we had a check in..status check in Mission Control here by Flight Director Tommy Holloway with the systems engineers who had been reviewing the data being downlinked from the spacecraft and all reported that the systems that they watched over were in good shape and Columbia still continues to run along smoothly. There's about 30 minutes left in the crew's sleep period and the nearest ground station to that time where we might be waking up the crew would either be Yarragadee in western Australia or Orroral just a few minutes later in eastern Australia. Just another reminder that the change of shift briefing for the offgoing Ivory Team flight controller, flight director is scheduled for approximately 5:30 Central Time, Room 135 in Building 2. That will be Flight Director Tommy Holloway. Five days, 18 hours, 31 minutes mission elapsed time. This is Mission Control Houston.

PAO This is Shuttle Mission Control at 5 days, 18 hours, 56 minutes. We are just a half a minute away from acquisition of signal through UHF the station at Yarragadee. Still 4 minutes remaining in the crew's sleep period but if they follow their characteristic behavior of this flight, it's a good chance that they'll be up and around, although we have no downlink telemetry at Yarragadee and we'll be unable to determine whether they've got cathode ray tube displays on or if they're up and around unless, of course, they initiate contact with the ground. The wake up period does expire during this pass at Yarragadee. There's 3-1/2 minutes left in their sleep period and we'll be within reach of Yarragadee for 6-1/2 minutes, so there's a good chance that we may have some dialogue with the crew here

for the first day of their...first discussion of their 6th day in space. Flight Director Harold Draughon and his Crystal Team are in the Mission Control Center and are receiving the handover instructions and advice from Tommy Holloway and the Ivory Team. Flight Director Holloway will be available for a change of shift briefing at 5:30 a.m. in the Johnson Space Center News Center in Building 2, Room 135. Standing by for contact with the crew during this 94th orbit of the Earth at 5 days, 18 hours, and 57 minutes. This is Shuttle Mission Control.

END OF TAPE

PAO Mission Control Houston. Five days, 13 hours, 59 minutes mission elapsed time. We're currently on...currently in the crew's sleep period. About 5 hours left to go in that and the shuttle is passing over the area of India and China at this time. We'll be passing over a ground station at Guam in about 15 minutes where data will be downlinked to the ground and flight controllers here in Mission Control will continue to monitor the status of systems onboard the Columbia. The flight controllers here in Mission Control have recently been receiving a weather status report and the outlook for Sunday, should a landing be required on that day, is good and conditions are also acceptable for Monday morning, although they may not hold for late Monday afternoon and would again perhaps be acceptable on Tuesday. Five days, 14 hours mission elapsed time. This is Mission Control Houston.

PAO This is Mission Control Houston. Five days, 15 hours mission elapsed time. We're on about the final 10 minutes of orbit number 91 of the space shuttle Columbia. Just completed a pass over Santiago Chile tracking station where the ground controllers observed the data coming down from the onboard systems and pronounced everything in good shape at this point in the evening. During that pass the downlink data indicated the cabin temperature was 85 degrees and the humidity in the cabin was 43%. Columbia is in approximately a 134 by 124 nautical mile orbit and is currently passing over the central portion of South America. Five days, 15 hours mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston. Five days, 16 hours mission elapsed time. We are on orbit number 92 at the present time, just passing off to the east of Australia. Crew has right about 3 hours remaining in the sleep period and in Mission Control, the activity centers around preparing the teleprinter messages to send up to the crew in a few hours, outlining their day's activities. Most of the work tomorrow centers around flight control system checkout and housekeeping activities, getting prepared for nominal entry on Monday. Five days, 16 hours mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston at 5 days, 17 hours mission elapsed time. We are on orbit number 93 out over the middle east at this time. Crew has about 2 hours remaining in their sleep period. On the recent data pass over Madrid, the data downlinked indicated it was cooling off slightly in the cabin, being 83 degrees, humidity 44%. Columbia's current altitude is about 136 nautical miles and the period of the orbit, that is how long it takes it to complete 1 orbit, is 1 hour, 29 minutes, 17 seconds. Most of the teleprinter messages have been completed and will be shipped up to Columbia about the time the crew wakes up so that they may begin reading those in their post sleep activity period
END OF TAPE

PAO Mission Control Houston, 5 days 11 hours 49 minutes, mission elapsed time. Just completed a pass over the Santiago tracking station. And data was coming down from the spacecraft to ground controllers here in Mission Control. The flight controllers will continually monitor the status of the vehicle through the night as it passes within range of ground stations that are, that can receive data which is coming down from the orbiter. We're currently on orbit number 89 down over the southern part of South America and about to cross out over the Atlantic. We'll be passing within range of the Ascension Island tracking station in about 9 minutes. Orbiter is currently at an altitude of 129 nautical miles and is in an orbit with an apogee of a 133.4 nautical miles and a perigee of 124.5 nautical miles. It takes 1 hours 29 minutes and 19 seconds to make an complete revolution. It's currently located at latitude 36.7 south and longitude 55.1 west. The crew has been in their scheduled sleep period for only about an hour now. And the flight controllers in mission control continue to make updates tc the crew activity plan for tomorrow. And scheduling the events on the last full day of flight which include many items and getting ready to come home on Monday. At 5 days 11 hours 51 minutes mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston, 5 days 12 hours 5 minutes, mission elapsed time. Just passed out of range of the Ascension Island station where we had data downlinked. At the present time we are just coming to the end of the 89th orbit. Just about to cross out over the African continent. Columbia just a moment agc crossed the Greenwich Meridian and is at latitude 7.3 south. The vehicle is at a altitude of 126 nautical miles at the present time. The crew is about an hour and 10 minutes into their scheduled sleep period. Cabin temperature is a quite warm 86 degrees and a humidity of 44. At 5 days 12 hours 6 minutes mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston, 5 days 13 hours 1 minute mission elapsed time. Columbia is on its 90th orbit of the Earth. Sweeping down over the South Pacific Ocean at this time and about half way between the Guam tracking station and that at Santiago, Chile. The vehicle will be passing over the Santiago station in about 16 minutes where the systems onboard the spacecraft will be under observations by the crew here in Mission Control who Continue to monitor the conditions of the spacecraft as it flies on this evening. The crew has been asleep about 2 hours now and the flight controllers here in Mission Control continue to work on teleprinter messages for sending up to crew in the morning the list of their days activities. 5 days 13 hours 2 minutes mission elapsed time. This is mission control Houston.

PAO Mission Control Houston, 5 days 13 hours 59 minutes, mission elapsed time. We're currently in the crew's

sleep period about 5 hours left to go in that. And the shuttle is passing over the area of India and China at this time. We'll be passing over a ground station at Guam in about 15 minutes where data will be downlinked to the ground. And flight controllers here in Mission Control will continue to monitor the status of systems onboard the Columbia. The flight controllers here in Mission Control have recently been receiving weather status report and the outlook for Sunday should a landing be required for that day is good and conditions are also acceptable for Monday morning. Although they may not hold for late Monday afternoon. And would again perhaps be acceptable on Tuesday. 5 days 14 hours mission elapsed time. This is Mission Control Houston.

END OF TAPE

PAO Going to orbit 89 before going back to Santiago.

CAPCOM Columbia Houston through Santiago for 5 and a half minutes.

CAPCOM Columbia Houston through Santiago for 5 and a half minutes, how do you read?

SPACECRAFT Okay reading you loud and clear, how do you read George?

CAPCOM You're loud and clear Jack and the teleprinter message right here coming up at this (garble).

SPACECRAFT Okay I see it and we're using the middeck speaker box at the moment with our headsets turned off, and the speaker box on the upper deck turned off, we just thought we have been interrupted (garble) on the speaker box and it works real good.

CAPCOM Okay and its a real good COMM for us to Jack. One question for you. Could you give us the status of the C02 absorber change out tonight.

SPACECRAFT Put A into B.

CAPCOM Okay thank you.

SPACECRAFT However there's a number 6 sitting there that hasn't been used.

CAPCOM Alright we copy that, 6 is still unused.

SPACECRAFT That's affirm. I guess we didn't need it. (garble).

CAPCOM And Columbia Houston one more switch to verify. W would like to check if the DFI PCM recorders in low sample, over

SPACECRAFT That's verified, low sample.

CAPCOM Okay thank you.

SPACECRAFT How long are you working tonight George?

CAPCOM This is our last pass Jack.

SPACECRAFT Well we thank you for sticking with us today.

CAPCOM And Columbia Houston, one comment, your state vector stills needs some updating and we'll be working on that tonight. And get a teleprinter up when its good. And the ivory team will be releaving us and they just informed me they will be

watching over you real close tonight. So have a good sleep and look forward to working with you tommorrow.

SPACECRAFT Okay, thank you Pinky, same here and we'll be hearing from the lead team in the morning (garble) It seems like they get the bad deal every night don't they?

CAPCOM They say they like it. And Columbia we're 30 seconds to LOS your vehicle configuration looks good for the night and goodnight guys, have a good sleep.

SPACECRAFT Hasta manyna to all of you.

PAO This is Shuttle Control. Columbia out of range of Santiago. On the evenings last pass before the sleep period. Bedtime about 44 minutes from now. And Columbia is in configuration for that sleep period. Next station will be Santiago in 1 hour and 28 minutes. At 5 days 10 hours 16 minutes, mission elapsed time. This is Shuttle Control Houston.

PAO Mission Control Houston, 5 days 10 hours 20 minutes mission elapsed time, one more reminder that there will be the change of shift conference coming up in about 10 minutes in room 135 of building 2 with offgoing flight director Neil Hutchinson. And chief of the medical sciences division, Dr. Sam Pool. This is Mission Control Houston.

PAO Mission Control Houston at 5 days 11 hours 6 minutes, mission elapsed time. We're currently on orbit number 89. Columbia about to start a long pass out over the Pacific Ocean and we're still about 40 minutes away from the nearest station where ground controllers will be getting real time data. The crew has just entered into their scheduled sleep period. And ground controllers here in Mission Control are using the night time hours to update the activities planned tommorrow. And we'll be keeping updated during the night if anything changes. But right now the vehicle is securely button down and ready for the night. At 5 days 11 hours 7 minutes, missin elapsed time. This is Mission Control Houston.

PAO Mission Control Houston, 5 days 11 hours 49 minutes, misssion elapsed time. Just completed a pass over the Santiago tracking station. And data was coming down from the spacecraft to ground controllers here in Mission Control. The flight controllers...

END OF TAPE

SPACECRAFT (garble) .03 or 4 on each of them.

CAPCOM Okay. We copy that.

CAPCOM Columbia, while we're thinking about that, I wonder if we could get the IMU torquing times. We'll pick up the angles on the playback. Over.

SPACECRAFT Okay. I torqued them at 90312 George.

CAPCOM Copy Jack. Thank you.

CAPCOM Columbia. Gordo, we'd like to get to null align on the SUSIM coming up here A7 1000 only if the D-core and Y-core or greater than .05. If they remain less, you can leave it as it for the night. Over.

SPACECRAFT Okay. I think I'll give it a little tweak then because occassionally 1 is more than .05.

CAPCOM Okay. We copy. For information, there's no checkpoint required for tonight. We've made very few TMBU's.

SPACECRAFT Okay. No checkpoint. I almost forgot the tire pressures George, but there it is and we've started the water dump and also run the fuel cell purge. How about looking at the fuel cells flows, will you please?

CAPCOM Roger Jack. We'll look at those.

CAPCOM And Columbia, Jack, we saw 3 good purges.

SPACECRAFT Okay. You got your BFI container 1, 2, and 3 data okay?

CAPCOM Roger Jack. We got that. You can go ahead and shut that off.

SPACECRAFT All right.

CAPCOM And Columbia, we're 50 seconds to LOS. Santiago is our next pass at 10:09 and it'll be our last pass of the night. Just a brief note of explanation on the attitudes for the OMS burn. We made a procedural error on the ground and read you the wrong attitudes for burn 1. Your onboard attitudes were correct. Over.

SPACECRAFT Okay. Glad to hear we're in the right attitude George. Thanks a lot.

CAPCOM Roger, and we've got our thinking figured out here and it won't happen again. Over.

SPACECRAFT No problem. It's always good to have a good attitude about this space flight thing. We've got a note here that says DFI high, PCM to high sample. I guess you still want that?

CAPCOM Roger. That's low sample Jack. Over.

SPACECRAFT Okay.

PAO This is Shuttle Control. Hawaii out of range of the Hawaii station. Santiago is next in 18-1/2 minutes. Santiago will be the last station today in which the ground will initiate conversation with the crew and going into their presleep activities. Bedtime for Columbia's crew, 1 hour, 8 minutes, 30 seconds from now at 5 days, 9 hours, 51 minutes mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 5 days, 10 hours, 6 minutes mission elapsed time. Columbia is 3 minutes away from the tracking station at Santiago Chile. The change of shift briefing with Flight Director Neil Hutchinson is scheduled for 8:30 p.m. Central Standard Time in the JSC News Room. 8:30 p.m. Central Standard Time for the change of shift news conference.

PAO This is Shuttle Control at 5 days, 10 hours, 8 minutes mission elapsed time. Santiago will acquire Columbia in about 40 seconds. This is the last pass of the day where communications are scheduled. Columbia will not be in contact with another tracking station after leaving Santiago until it gets back to Santiago on this orbit. Columbia now in the latter third of orbit 88 and we'll go into orbit 89 before going back to Santiago.

CAPCOM Columbia Houston through Santiago for 5-1/2 minutes.

END OF TAPE

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CAPCOM So Jack, we'd just like the current PGU reading.

SPACECRAFT Okay, 321 mark.

CAPCOM Columbia Houston, Jack on the PGU we'd just like the current readings on the, that you just took on the PGU, over.

SPACECRAFT Okay, Dave, 9 hours and 10 minutes, all the lights are okay. Number 7 is, (garble) Okay, I'm going to close the B reg 1. Opening the right OMS B-reg, 321 mark.

CAPCOM Columbia, Gordo, we see the pressure rising.

SPACECRAFT Okay, and Jack will come ahead with the numbers now.

CAPCOM Roger, Gordo, you can close the B regs now and we're ready for Jack.

SPACECRAFT Okay, B regs closed. Okay the PGU data that I just read was at 509 and 10 minutes, 27.6, 28.0, 27.7, 27.7, 27.9, 28.1, you copy?

CAPCOM We copy Jack, thank you. Columbia, we're 50 seconds to LOS, Hawaii is next at 9 + 43.

SPACECRAFT Okay, sun came up, but we got a ways to go here. I guess we'll get there, we always roll Sunday, here.

CAPCOM Roger, and we're watching that printer.

PAO This is shuttle control, Columbia is out of range at the Indian Ocean station. Spacecraft began its 88th orbit during acquisition at IOS. The latest readings on the plant growth experiment during this pass and the orbital maneuvering system was repressurize that being necessary because of the test burn sometime ago. Next acquisition is through Hawaii in 28 minutes, and 39 seconds. Crew about an hour and 45 mintues away from retiring fom the night. At 5 days, 9 hours, 14 minutes, mission elapsed time, this is shuttle control, Houston.

PAO This is shuttle control, at 5 days, 9 hours, 36 minutes, mission elapsed time. Columbia is over the north Pacific Ocean, 6 and a half minutes away from acquisition through Hawaii on orbit 88. Flight director Neil Hutchinson has rescheduled his change of shift news conference to 8:30 p.m. CST, in the JSC news center for the change of shift briefing with flight director Neil Hutchinson. This is shuttle control.

PAO This is shuttle control at 5 days, 9 hours, 42 minutes, mission elapsed time. Columbia has locked on to the Hawaii tracking station. There's a private medical

communications scheduled for the first part of this pass. So we don't expect any conversation for a while. We'll standby.

CAPCOM Columbia Houston, we're back with you at Hawaii for 3 and a half minutes.

SPACECRAFT Okay, George, sort of watching this P core Y core, trying to decide where I need to tweak or not. It probably needs a little, it really takes a long time to watch it and figure out just where the middle of the band is. It's not a real regular oscillation.

CAPCOM Okay, we copy that Gordo, and we'll get to it.

SPACECRAFT If you've got any better data here, we'll accept it. But right now I'm thinking in terms of about a minus .03 or 4 on each of them.

CAPCOM Okay, we copy that.

End of tape.

CAPCOM Columbia Houston. Jack, there's one minute of leeway in that number.

SPACECRAFT Okay. Thank you very much.

CAPCOM Roger. And Columbia, some information on your DFI PCM recorder. We've got three continuous runs left before the entry rewind. They're the 30 minutes for the FCS checkout and APU prestart. The 6 minutes for the RAD heat sink test, and 6 minutes, again, for the RAD heat sink test and that leaves us a pad of only 2 minutes so we'll have to watch that one.

SPACECRAFT Okay. We will be very careful about it. Thank you George.

CAPCOM Roger.

SPACECRAFT One thing we gave a try at, I don't know if it has any chance of coming out, we stuck a hasselblad on a mount in the back window and I held a remote control cable during the OMS DTO and I'm going to try to get a little picture of the OMS firing.

CAPCOM Okay. We copy and we'd like to look at that one when you come down.

SPACECRAFT Those two stars for the IMU alignment are right where you said they were going to be George.

CAPCOM Roger Jack.

SPACECRAFT I guess some things never change, huh?

CAPCOM That's affirmative.

SPACECRAFT Especially for you astronomers.

CAPCOM Because we couldn't remember them if they moved.

CAPCOM Columbia, we're 40 seconds to LOS. Indian Ocean is next at 9 plus 05. For your information, we sent an accelerometer bias of this pass and we will be sending one up over IOS, and at IOS we'd like somebody up in the front cockpit to do some OMS RCS reconfig for us.

SPACECRAFT Okay. We can handle that. Working on the IMU alignment right now.

CAPCOM Copy that.

PAO This is Shuttle Control at 5 days, 9 hours, 3 minutes mission elapsed time. At LOS Botswana, Jack Lousma was aligning the inertial measurement unit. We'll have acquisition

at the Indian Ocean Station in just under 2 minutes. During this Botswana pass, Gordon Fullerton reported, he attempted to get a photo of the OMS test firing through the aft window. He doesn't know how successful he was. We'll stand by for communications through the Indian Ocean Station.

CAPCOM Columbia Houston through Indian Ocean for 7-1/2 minutes.

SPACECRAFT Okay. Indian Ocean George, we just started our maneuver back to top sun and it looks like you want me to get the trackers off now.

CAPCOM That's affirmative Jack, and that's a thermal test on the star tracker.

SPACECRAFT Oh, okay.

CAPCOM Columbia Houston, we'd like to terminate the interconnect at this time. That's on page 8-4 of the pocket checklist, and a reminder for gaging protection, we'd like to make sure and get the item 6 execute prior to the item 7 execute. Over.

SPACECRAFT Okay. I'll do that.

CAPCOM Roger, and Gordo, after the interconnect is terminated, we'd like to repress both the left and right OMS using the helium press vapor isol B and we'd like to see that over the site if we could.

SPACECRAFT Okay. (garble). How long we got?

CAPCOM You've got 5 minutes and 40 seconds.

SPACECRAFT Okay. And George, I've got some PGU data for you if you will tell me how far back we need to go today, I'll read it up to you, or down to you, however it goes.

CAPCOM Roger. Stand by one.

CAPCOM Roger Jack, and...

SPACECRAFT (garble) if PROP is ready, I'll repress the left OMS through the B leg.

CAPCOM Roger Gordo. We're ready for that. And for Jack, we'd just like the current PGU data.

SPACECRAFT Ok, 3, 2, 1 mark.

END OF TAPE

SPACECRAFT Okay, I guess what we'd really like to do is just turn them on and we can start picking up the coast and we hit the coast around MACH 14 over L.A. So we want to turn them on sometime before that. And maybe if we turn them on about the time we were able to see the coast on the T.V. camera and the 60 mm anyway, then we could just leave them run all way, and then be about right, is that correct, or is that done wrong?

CAPCOM Standby Jack, we'll check that number for you.

SPACECRAFT Yeah, I'd like a MACH number which is a 16 minutes from wheel stop date for example.

CAPCOM Okay, we'll cover that.

SPACECRAFT Okay, that would give us an idea when to turn them on and then we wouldn't have to cycle them cause that's a hard thing to remember as it is.

CAPCOM Roger. Columbia we're 45 seconds to LOS. Botswana is next at 8 + 57.

SPACECRAFT Okay. And I haven't been able to get to the EEVT yet, you may have to think about working that in tomorrow.

CAPCOM Roger, Jack, we already got it worked in if you need it.

SPACECRAFT Okay, that leaves an hour and a half of wasted or better so it looks like we probably won't get time to make it tonight.

CAPCOM We copy, that's no problem.

PAO This is shuttle control, Columbia is out of range at Santiago. Heading toward acquisition through Botswana in 15 and a half minutes. Pilot Gordon Fullerton is exercising at this time. Jack Lousma completed his exercise period a little while ago. He reports the exerciser works good, wanted that message passed on to astronaut Bill Thornton, a medical doctor who designed the exerciser. It's an apparatus with straps, allows you to jog in place. It does not have a treadmill device or a slippery floor surface. It just allows the subjec to jog in place. They remarked that they did get some television on the video tape recorder of the exercise. And Lousma has asked for a mach number 16 minutes from wheel stop, he wants to use that as a guide for turning on 16 mm movie cameras in the cockpit for landing. He also reported he does not think he will be able to do the electrophoresis sample number 7 tonight, and that will be rescheduled for tomorrow. We're 14 minutes away from Botswana, at 5 days, 8 hours, 43 minutes, mission elapsed time, this is shuttle control, Houston.

PAO This is shuttle control at 5 days, 8 hours, 56 minutes. Columbia will lock on at Botswana in about 30 seconds.

CAPCOM Columbia Houston with you through Botswana for 5 minutes.

SPACECRAFT Okay, George, we hear you loud and clear, how me?

CAPCOM You're loud and clear Jack.

SPACECRAFT We both ran like crazy for 10 minutes each, but we didn't get anywhere.

CAPCOM Looks like you got half way around the world to us, Jack, Gordo.

SPACECRAFT That's right, don't let them forget that.

CAPCOM And Columbia, Jack,that MACH number, forgetting the dex on, it will be MACH 15 and that should cover you through rollout.

SPACECRAFT Okay, MACH 15, we'll cover you through rollout, okay.

CAPCOM And that's at 6 frames per second on the DAC cameras.

SPACECRAFT Okay, that means that they can both run continuously from MACH 15 and still make it to the end.

CAPCOM That's affirmative.

SPACECRAFT Okay, actually I'd like to turn them on over sooner than that and if there was any leeway in there I'd like to know about it. Maybe what we need to do is cycle one time for a roll reversal, and then turn them on continuous.

CAPCOM Roger, Columbia, standby, we'll check into to see if there's any leeway in there.

SPACECRAFT Alrighty, thank you.

CAPCOM Columbia Houston, Jack, there's one minute of leeway in that number.

SPACECRAFT Okay, thank you very much.

CAPCOM Roger and Columbia some information on your DFI PCM recorder. We've got 3 continuous runs left before the entry

End of tape.

CAPCOM is zero percent, tank alpha through nine zero percent. Over.

SPACECRAFT Okay, dumper on down to a ninety percent. The IMU align, do you think that will be required, I mean the maneuvers?

CAPCOM Stand by. Columbia Gordo, that's affirmative, you will need to do the maneuver for the IMU alignment.

SPACECRAFT Okay.

CAPCOM And Columbia we're 30 seconds to LOS, Santiago is next at 8 plus 35. And Jack's exercise seems to have no effect on the SUSIM. I looks like its right on. Over.

SPACECRAFT Okay and I wanted to ask you about that wheather it'slose enough for government work here. They're generally less than 3 hundredths of a degree.

CAPCOM Roger that looked real good. See you at Santiago.

PAO This is Shuttle Control. Hawaii has loss contact now with the Columbia. During this pass we CAPCOM, George Neilson read up a message from the employees at the Hawaii tracking station thanking Columbia's crew for downlinking the music Blue Hawaii to them yesterday while they were over that station. Columbia now on orbit 87, with next acquisition through Santiago, Chile in 19 minutes and 20 seconds. At 5 days 8 hours 16 minutes mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 5 days 8 hours 35 minutes mission elapsed time. Santiago is about to acquire Columbia.

CAPCOM Columbia Houston through Santiago for 5 and a half minutes.

SPACECRAFT Okay glad to hear you George for 5 and a half minutes. All is well.

CAPCOM Roger that and you're loud and clear.

SPACECRAFT Okay we cranked up the exercise and I've got 10 minutes on and Gordo's getting his exercise right now. It really works good.

CAPCOM Roger that's good to hear.

SPACECRAFT You'll pass on my complements to Bill Thornton, you don't have to use hands to hold on to anything, the force straps

work good, you can run as fast or slow as you want to and you seem to work up a sweat and it gives your legs good exercise.

CAPCOM Okay Jack and we'll pass that on.

SPACECRAFT We even got some TV of it.

CAPCOM That's great Jack. Columbia Houston, Jack I've got a couple of switches on R1, cryo heater switches if you're up there.

SPACECRAFT Okay, fine we'll head in that direction.

CAPCOM Roger. Our plan is to get one of the cryo systems down to about 10 percent so we can get some data at those low levels and in order to help us do that we would like to get the O2 and H2 heaters on tank 3 to OFF.

SPACECRAFT Okay that was 3 switches. On O2 tank 3 heater A off, B was already off, and the H2 tank heaters both went from auto to off.

CAPCOM Roger Jack, and we see it down here and that should let tank 4 get down to about 10 percent.

SPACECRAFT Okay good.

CAPCOM And Jack one more note of interest. Georgetown beat Louiville this afternoon 50 to 46. So it will be Georgetown and North Carolina in the finals.

SPACECRAFT And that's going to be played tommorrow?

CAPCOM That's Monday, Jack.

SPACECRAFT Oh Monday. That wasn't a very high scoring game but it was a good oM Roger Jack, and we see it down here and that should
let tank 4 get down to about 10 percent.

SPACECRAFT Okay good.

CAPCOM And Jack one more note of interest. Georgetown beat Louiville this afternoon 50 to 46. So it will be Georgetown and North Carolina in the finals.

SPACECRAFT And that's going to be played tommorrow?

CAPCOM That's Monday, Jack.

SPACECRAFT Oh Monday. That wasn't a very high scoring game but it was a good one, I bet you.

CAPCOM I'll bet it was. And Columbia, Jack, one more thing that you can pass on to Gordo. The six frames per second on the entry 16 milimeters is okay with us. That should give you about 16 minutes of film and that's not going to be quite enough to get down from the first roll reversal that occurs at 19 to 20 minutes prior to touchdown. So you'll have to cycle the cameras in order to insure covery rollout. Over.

SPACECRAFT Okay. I guess what we'd really like to do is just turn them on and we could start picking up the coast and we hit the coast around mach 14 over LA, so we want to turn them on sometime before that. And...

END OF TAPE

CAPCOM Columbia Houston, we're 30 seconds LOS and the Indian Ocean is next at 7 plus 34.

SPACECRAFT Ok.

PAO This is Shuttle Control, Botswana has loss of signal. The Indian Ocean station will see Columbia on this orbit in four and a half minutes. Columbia's pilot Gordon Fullerton attempting to photographically document the commander Jack Lousma during his exercise period. And Jack Lousma remarked he had time this evening to do the electrophoresis experiment sample number seven, that had been an optional sample, so he will complete that this evening. And we've asked the crew to bring back some of the water from the chiller, the water that's had some bubbles in it. We'd like to analyze it after the mission. IOS ask in about three and a half minutes at 5 days, 7 hours, 30 minutes mission elapsed time. This is Shuttle Control Houston.

CAPCOM Columbia, Houston through Indian Ocean for 3 and a half minutes.

SPACECRAFT Ok, read you loud and clear George.

CAPCOM I hear you loud and clear also. Our reminder, we'll not be recording voice after this pass.

SPACECRAFT Ok.

CAPCOM Columbia, we're one minute LOS, Hawaii's next at 8 plus 10.

SPACECRAFT Ok.

CAPCOM Columbia, Houston you can ignore the OMS quantity alert you just had.

SPACECRAFT Allright, and I'm glad you mentioned that.

PAO This is Shuttle Control, the Indian Ocean station has lost signal with Columbia which will begin it's 87th orbit in just a few minutes. Next acquisition through Hawaii in 31 and a half minutes, at 5 days 7 hours 38 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control, Hawaii has acquisition of Columbia at 5 days 8 hours 9 minutes mission elapsed time.

CAPCOM Columbia, Houston with you through Hawaii for five minutes.

SPACECRAFT Ok, you may hear some rumbling in the background that's Jack breaking up a head of steam on the treadmill and he's

shaking the whole cockpit doing it literally.

CAPCOM Roger.

CAPCOM Columbia, Gordo I have a note we received from the tracking site in Hawaii I'd like to read up to you, if you've got a minute to listen.

SPACECRAFT Yeah, Jack's not (garble) but I'll take it, unless you want me to get him to stop and listen.

CAPCOM You can pass it on to him.

SPACECRAFT Allright.

CAPCOM The message from the station director and all the personnel of Hawaii tracking station. They say we feel very proud to be playing a small part in this historical event, Columbia's first pass over the Hawaii tracking station yesterday brought a lot of cheers over our station when we heard Blue Hawaii being played by Jack and Gordon. And we sincerely appreciate being recognized by the crew. And it's signed Aloha, Mahalo, and God's speed, over.

SPACECRAFT Tell Aloha from Columbia in return, thank you very much for nice work.

CAPCOM Roger.

CAPCOM Columbia, Houston have some water dump numbers for you when you're ready.

SPACECRAFT Allright, just a minute....Ok, go ahead George.

CAPCOM Roger, like to dump tank bravo to 0 percent, tank alpha to 90 percent, over.

SPACECRAFT Ok, dump her on down to A, that's A 90 percent. The IMU align, you think it'll ever be required, I mean the maneuver?

CAPCOM Standby. Columbia, Gordo that's affirmative we will need to do the maneuver for the IMU alignment.

SPACECRAFT Ok.

END OF TAPE

PAO At 5 days 6 hours 50 minutes mission elapsed time this is Shuttle Control Houston.

This is an audio check on a PAO commentary line 10 9 8 7 6 5 4 3 2 1.

PAO This is Shuttle Control at 5 days 7 hours 22 minutes mission elapsed time. Columbia in it's 86th orbit coming up on acquisition at Botswana.

CAPCOM Columbia, Houston coming through Botswana for about 5 and a half minutes.

SPACECRAFT Okay George loud and clear trying to figure out a way to get a camera on this exerciser and working on that, and a way to document it also.

CAPCOM Roger, Gordo we copy and you're loud and clear.

SPACECRAFT Jack's pretty well got it mastered if he doesn't fall off of it anymore and gets a pretty good head of steam on it. But getting cameras to point at it is more of a challenge.

CAPCOM Okay, we copy and Bill Thornton will be happy to hear that.

SPACECRAFT Can we give you any numbers or anything. It seems like it was something but I can't remember what it was.

CAPCOM Columbia, negative I have one thing I'd like you to check for us on the OSS-1 tape recorder and then one short note from the EECOM's about filling a couple of water bags for us and that's it.

SPACECRAFT Roger.

CAPCOM Roger, up on the OSS-1 tape recorders if you could check the status of the power switch.

SPACECRAFT This is Columbia you copy?

CAPCOM Roger, loud and clear.

SPACECRAFT Power switch is O N. Did I miss that or something?

CAPCOM Negative and I'd like to check the channel switches. Channel 1 should be enabled with the light on and 2 disabled with the light off.

SPACECRAFT Oh, okay. Well I have channel 1 on disabled, how did I get this all messed up? Do you want to go power on and channel 1 enabled? Is that correct?

CAPCOM Roger, that's affirmative.

SPACECRAFT Okay, the power's on, forward lights on, channel 1 light's on, channel 1 is enabled.

CAPCOM Roger, then could you track select number 16 for us then get the monitor level.

SPACECRAFT It's 3.

CAPCOM Okay, we copied 3, thank you.

SPACECRAFT Hey, George I got a question for you.

CAPCOM Go ahead.

SPACECRAFT I don't think any of you'd have any objection if in my spare time I went ahead and did that last electrophoresis sample number 7, would you. I noticed it's not scheduled for tomorrow and I got time to do it tonight.

CAPCOM Roger, Jack if you can fit that in tonight, that would be fine, we were gonna schedule it tomorrow. If you can get it in, that would be great.

SPACECRAFT Okay, I'll go ahead and do it, thank you.

CAPCOM Roger, and on the water bags, what we'd like you to do is fill an Apollo type water bag and a Shuttle type drink bag, preferably one with something dark in it, Strawberry or tea from the chiller and then document any bubbles you might have with the 35 mm camera and then stow both those containers for ground analysis, over.

SPACECRAFT Okay, we already did the Strawberry drink bag that malfunction had in there.

CAPCOM Roger, we copy that and are you sure you filled that from the chiller?

SPACECRAFT That's affirm.

CAPCOM Roger.

SPACECRAFT And just generally, what did I can go ahead and do that, but the bubbles are about gone, you get pretty pure liquid out of it now.

CAPCOM Roger, we copy that sounds good.

SPACECRAFT I apologize, I got in a scramble to make that MET of disable and got my TR 1 and TR 2's mixed up. Sorry about

that.

CAPCOM That's no problem, go ahead.

CAPCOM Columbia, Houston we're 30 seconds to LOS and Indian Ocean is next at 7 plus 34.

SPACECRAFT Okay.

END OF TAPE

CAPCOM Roger, copy 0 6 14 and monitor level 3 thank you.

SPACECRAFT Also, this old machine has pretty good alignment evidently, my initial p core y core averaged out to be p core of a plus .14 and a y core of a minus .02. That was without any adjustments at all with pitch and yaw of 9 8 0. I made one correction I'm watching that deadband a little bit. Looks like I still need a little more p core and I'll pick that up.

CAPCOM Roger, Gordo we're watching that and it looks real good to us too and SUSIM reports they're getting good data.

SPACECRAFT Okay, we may have goofed up a little data post burn. We followed the Orbit ops postburn checklist and put the DFI recorder to high sample right after the second burn. Then we got to looking in the CAP and it said go to high sample at 15 minutes after something like that and figured we probably somebody wanted us to be (garble) and just shut it off a few minutes ago. I put it back to high sample rather.

CAPCOM Roger, Gordo we had handover there in the middle, we lost about the last three sentences, over.

SPACECRAFT Okay, I was just tellin' you what we did with the DFI recorder after the burn we followed the Orbit ops checklist and put it into high sample right away. We know that they said high sample in the CAP later on and we figured you probably wanted it left continuous postburn well we missed that. We put it back to continuous at 0 6 10 and let it run till at about 0 6 38 and then now we're in high sample again I hope that's just the data we need on the OMS engine.

CAPCOM Roger, Gordo we copy and fire information we showed the we'd like you to confirm that the burn was done with the helium valves in GPC rather than in blowdown, over.

SPACECRAFT No, we left the heliums closed. Is that wrong? It was a blowdown burn.

CAPCOM Roger, Gordo we copy and that's fine.

SPACECRAFT (garble) the plan George? I think that's the way the burn card read anyway.

CAPCOM Roger, Gordo that's no problem at all and OMS looks real good.

CAPCOM Columbia, Houston 2 minutes left this pass. If we could sometime we'd like to get the tail movement down from EEVT sample number 8, over.

SPACECRAFT Oh, yeah, we'll get that and give it to you.

CAPCOM Roger, and there's no rush on that.

SPACECRAFT Okay, Jack's going down for it. Cryo tank (garble) together at still 6 40.

CAPCOM Roger, we copy.

SPACECRAFT I don't like to keep you guys waiting George. Here's the sample 8 data at 10 minutes zero millimeters not visible. At 2 0 minutes 2 and one half millimeters. At 3 0 minutes 4 0 millimeters. At 4 0 minutes 5 0 millimeters. At 5 0 minutes 6 0 millimeters. And there's a note here that a very faint second band was noted at 4 0 millimeters after 50 minutes.

CAPCOM Roger, Jack we copy, thanks a lot. Forty seconds left this pass and Botswana's next at 7 plus 23.

PAO This is Shuttle Control Buckhorn has loss of signal. Next acquisition will be through the Botswana tracking station in 34 minutes. Payloads officer Bill Boone reports that ground data on the SUSIM, the Solar Ultraviolet Spectral Radiance Monitor is looks excellant. Columbia now in orbit of 125 by 133 nautical miles with an orbital period of 1 hour and 29 minutes 24 seconds. At 5 days 6 hours 50 minutes mission elapsed time this is Shuttle Control Houston.

END OF TAPE

PAO At 5 days, 5 hours, 54 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 5 days 6 hours. The crew of Columbia should be performing the cold OMS engine restart now, Columbia is over the Indian Ocean. We may get a report on this point at Hawaii, but it's a very short pass, we may not have a long enough time or a good comm out there, we'll try. This is a test of the OMS engine which has been away from the sun now for some 80 hours, temperatures on those engines however have not fallen to as low as expected. Soon after this engine firing Columbia will maneuver to top sun attitude and should be top sun at Hawaii. At 5 days, 6 hours, 1 minute mission elapsed time, this is Shuttle Control Houston.

CAPCOM Columbia Houston through Hawaii.

SPACECRAFT Hello there Houston through Hawaii, we have two good burns, we're in the top sun attitude on time and Gordo doing (garble) to Hawaii.

CAPCOM Roger Jack we copy that's good news, I have some bad news and good news for you; the bad news is North Carolina 68 and Houston 63, over.

SPACECRAFT Is that final?

CAPCOM That's affirmative.

SPACECRAFT Oh well there's always next year.

CAPCOM Roger Gordo and the good news is a congratulation up to you guys, with the completion of the OMS burn, we've now done a hundred percent of the activities we had scheduled in the CAP, you're back on the timeline, looks like we're ready for a hundred percent mission, over.

SPACECRAFT We're going to make it more than 100 percent.

CAPCOM Roger that.

SPACECRAFT We'll have a hundred percent with our good landing George, and we're going to do that too.

CAPCOM That's affirmative, sir.

SPACECRAFT Thanks for the news though, it's good to have you guys keep us up to date and keepin' after us so we'll get it all done, we want to make sure we do that.

PAO Roger, never fear we'll be there Jack and you may get an OMS RCS alarm coming up here and you can ignore it, and

going over the hill here the states are next at six forty two over.

SPACECRAFT Agree 6:42, thank you George.

PAO This is Shuttle Control, we have Loss of Signal at Hawaii. On orbit number 86 Jack Lousma reporting two good burns successful completion of the OMS cold restart, Capcom George Nelson telling him that with completion of that activity, the crew has completed 100 percent of the activities in the Crew Activity Plan. Columbia now in the top sun attitude, acquisition through Buckhorn in about 2 minutes 45 seconds, at 5 days 6 hours 40 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 5 days 6 hours 42 minutes mission elapsed time. We're standing by for acquisition through Buckhorn.

CAPCOM Welcome back George.

SPACECRAFT I've got some numbers for you George, the PDP we deactivated with tape recorder disabled at 0614 and power light status was off, and before that the track 16 monitor level was 3, over.

CAPCOM Roger, copy 0614 and monitor level 3, thank you.

SPACECRAFT Also this over here is a pretty good alignment of it and we, my initial P and Y core averaged out to be....

END OF TAPE

PAO at 24 minutes mission elapsed time this is Shuttle Control Houston.

SPACECRAFT Jack, we're 15 seconds to LOS. The EEVT.....

PAO This is Shuttle Control at 5 days 5 hours 45 minutes that was not a live transmission a few seconds ago. Columbia's been over the middle of the south Atlantic someone was doing a playback of air to ground and inadvertently got in on the air to ground loop. We're 4 minutes and 5 seconds away from Botswana. This is Shuttle Control at 5 days 5 hours 49 minutes mission elapsed time. Columbia is approaching the range of the Botswana station for a 1 minute 16 second low elevation pass.

CAPCOM Columbia, Houston through Botswana for 1 minute.

SPACECRAFT Okay, hello George through Botswana we are maneuvering to the burn attitude. I notice 1 disparity and that is between your PAD attitude and the ones that we computed based on the delta V's you gave us. Our actual computed attitude is the one to which we're maneuvering and that is as follows. Roll to 6 7 pitch 1 9 8 and yaw 0 6 5.

CAPCOM Jack, we copy and verify use GD roll of 139 degrees.

SPACECRAFT (garble) computation. And let me give you what I've got loaded we got the left OMS selected plate.

CAPCOM Jack, you're 10 seconds LOS and you're go with the attitude you've got, over.

SPACECRAFT I've 1 correction plus 5 point 1. Wait, it's 2 1 8 6 5 0 a TIG if on the hour it's 6 hours even. And delta V's of plus 0 minus 1.8 and plus 0 when we calculated on those numbers.

CAPCOM Roger, Jack numbers are good, FIDO reads you're attitude looks good and you're go for the burn.

SPACECRAFT Roger, go for the burn. Thank you George. And we had a good gimbal check.

CAPCOM Okay, they had a good gimbal check and Hawaii is next.

SPACECRAFT See you there, George.

PAO This is Shuttle Control Botswana has loss of signal. Next station is Hawaii in ....

CAPCOM Columbia, Houston in the blind verify that use the TV roll of 139 degrees, over.

SPACECRAFT That's affirmative TV roll of 1 3 9.

CAPCOM Roger, we copy thank you.

PAO This is Shuttle Control we've had acquisition of signal longer than anticipated at that pass. Next acquisition to Hawaii in 44 and a half minutes. Hawaii pass predicted to be only 53 seconds long because of the elevation angle. Columbia will be performing the OMS cold start maneuver at an elapsed time of 5 days 6 hours even. That's 6 minutes 16 seconds from now. Firing of the lift Orbital maneuvering system engine first maneuver the burn duration is 2 seconds with a delta V change of velocity of 1.8 feet per second. Crew will then wait 4 minutes then fire the engine again for 14 seconds with a delta V of 12 feet per second. This burn is in an out-of-plane attitude. At 5 days 5 hours 54 minutes mission elapsed time this is Shuttle Control Houston.

END OF TAPE

SPACECRAFT Payload latches are coming now, in few seconds till they get open then we'll open the other door. Okay, the latches are open.

CAPCOM And Columbia we're all set for the door opening.

SPACECRAFT Okay, 3 2 1 mark.

CAPCOM And Columbia all the direct contacts look good to us.

SPACECRAFT And smae all onboard.

CAPCOM And Columbia, Houston that's it for the TV pass this time and thanks alot it was really fantastic.

SPACECRAFT Yeah, that was a little luck involved there with the timing but we're glad it worked out.

CAPCOM And Columbia, Houston the UHF voice check through Salinas Peak how do you read?

CAPCOM Columbia, Houston through Salinas Peak on the UHF check how do you read?

CAPCOM And Columbia, Houston update on the game at halftime it's North Carolina beating 31-29.

SPACECRAFT That sounds like a good one.

CAPCOM And Columbia, some information after the OMS burn this afternoon we're planning on staying on 2 GNC GPCs. Our consumables look good and we plan on that configuration for the rest of the flight, over.

SPACECRAFT (garble) about that.

CAPCOM And Columbia, one last note this pass. I've got the latest MET of disable for the PDP tape recorder.

SPACECRAFT Go on with it George.

CAPCOM Roger, that's at time 6 hours and 15 minutes and on one other note we'd like you to read the monitor level on track 16 before you disable that channel, over.

SPACECRAFT Okay, 16 (garble) it's at 615 (garble) MET disable and take a look at track 16.

CAPCOM Roger, Jack.

CAPCOM And Columbia, Jack for the payloads we just want to

make sure that we get that monitor level read before we switch the channel off.

SPACECRAFT Roger. This theodolite takes me back to the days with the Oregon state highway department.

CAPCOM Roger, Gordo we're 1 minute to LOS Botswana is next at 5 plus 50 and I think we can probably fix you up with the Oregon state highway department when you get back if you're interested.

SPACECRAFT It's always a good idea to have a skill in your hip pocket right George.

CAPCOM That's affirmative Jack.

PAO This is Shuttle Control. Merritt Island station has loss of signal. Columbia is moving down the ground track is moving down the east coast of Central America. It'll slice across South America on it's 85th orbit out into the south Atlantic and the next station will be Botswana for a very short pass, just slightly over 1 minute. Spectacular television during this pass over the United States. Great view of the Salton Sea, the gulf of lower California and of the payload bay door opening. The INCO on this shift Jay Connor was operating camera delta in the payload bay during that television pass. As we lost signal Gordon Fullerton remarked that the activities he's concerned with now took him back to his days with the Oregon state highway department. That was presumably a summer job while he was a student. He using the theodolite that's a surveyor's instrument that he apparently used in that job. We're 26 minutes away from acquisition at Botswana at 5 days 5 hours 24 minutes mission elapsed time. This is Shuttle Control Houston.

END OF TAPE

PAO resulting orbit expected to be 133 by 125 nautical miles. We're 13 minutes away from acquisition on the west coast of the United States. At 5 days 4 hours 55 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 5 days 4 hours 59 minutes mission elapsed time. The change in velocity on that first OMS burn, the 2-second burn, will be 1.8 feet per second and for the 2nd burn, the 14 second burn, 12 feet per second. This is Shuttle Control. This is Shuttle Control at 5 days 5 hours 7 minutes mission elapsed time. Standing by for acquisition through Buckhorn with television from the Goldstone station. We're about 30 seconds away.

CAPCOM Columbia, Houston with you through the states for 14 minutes.

SPACECRAFT Okay, we're hearing you George. We're taking our time here. We got all the theodolite readings just fine and we just couldn't open the doors and certainly get a 16 millimeter camera set up we thought it'd make a nice picture with the blue ocean in the background as it opens up.

CAPCOM Roger, Gordo, and we're seeing some good live TV.

SPACECRAFT Allright, now. Going on flight deck for a minute and then we'll holler while I open the door.

CAPCOM Okay. And Columbia, Houston, we'd like to make sure that we see the doors open so give us a word when you're gonna start, over.

SPACECRAFT Okay, we're ready to do it and if you'll you want us to start the camera or have you got the one picked out there?

CAPCOM Roger, standby 1. Columbia, Houston, which camera would you recommend?

SPACECRAFT Probably the D camera will look a lot better for you George. Hooked the delta camera around there maybe we can do it. The delta camera is all set up for you George, right now.

CAPCOM Roger, and we're seeing it now and you're go.

SPACECRAFT Okay, understand you got the D camera, right?

CAPCOM That's affirmative, we've got a good shot.

SPACECRAFT Wake up the aim arm little for you and here she comes. 321 mark. We're just coasting in just as they come open. That's really spectacular. Looks like the or is that

the California.

CAPCOM Roger, Gordo, we saw the coast go by. It is spectacular.

SPACECRAFT There's Santa Barbara down there, and have a good look at this ranch and Los Angeles is dead a stern. We can see the south bay area and Long Beach harbor.

CAPCOM Roger.

SPACECRAFT And you should be able to see just coming by the left wing tip the Solton Sea right now.

CAPCOM Roger, we see it now.

SPACECRAFT Starboard wing tip, actually, and the Imperial Valley, the vegetable farms there.

CAPCOM And Columbia, Houston, these are really spectacular pictures. The best we've see so far.

SPACECRAFT Let's see. Aim D camera left a little bit and you'll se the upper reaches of the gulf of California there. There we go. I believe that's Porta a fishing spot.

CAPCOM Roger, And Columbia, Houston, we'd like to see the port door open also if we could.

SPACECRAFT Allright, I'll get back to work.

CAPCOM Sorry about that.

SPACECRAFT Okay, the latches are coming now. Be a few seconds till they get open, then we'll open the other door. The latches are open.

END OF TAPE

SPACECRAFT pulse. 0.0, delta V Y is -1.8, and delta V Z is 0. 091189 and 069, 1.8 02 + 01.70 + 0.36 + 0.47, 133 by 125.

CAPCOM Roger, Jack, that's a good read back, and on the flip side I've got the data for burn 2.

SPACECRAFT Okay, go ahead with burn 2.

CAPCOM Roger, pitch + 0.2 + 5.1, jig 005060404, delta VX + 00.0, delta VY -12.0, delta VZ +0.0, burn attitude 091189069, delta V total 12.014 + 11.32 + 2.41 + 3.17, HA 133, HP 125, over.

SPACECRAFT Okay, that's +0.2 + 5.1, 2 balls 5060404, plus 3 balls -12.0 + 0.0, 091189069, 12.014 + 1132 + 241 + 317, 133 by 125.

CAPCOM Roger, Jack, and that's a good read back. And just for your information, noticed the burn was out of plane and that's to optimize our X CG for entry.

SPACECRAFT Yea, I noticed that, okay, understand, thank you George. We got the pass here.

CAPCOM Roger, we're 50 seconds to LOS, Gordo.

SPACECRAFT (garble) . You're probably going to disappoint a lot of thermal people but make a lot of astronauts happy, the doors as near as I can tell are no different and any of the latches as far as which one is going to get there first and they're all coming down on exactly the zero deflection trajectory right at point alpha.

CAPCOM Roger, Gordo, that's good news and with 20 seconds left I'd like to have you verify a switch for me please on R11.

SPACECRAFT Okay.

CAPCOM That's DFI wideband mission power should be off.

SPACECRAFT Yes it is. O F F, off.

CAPCOM Roger, copy, and going over the hill, just an update. North Carolina is leading Houston 14 to 4.

SPACECRAFT They're just getting started.

PAO This is Shuttle Control. Columbia has moved out of range at Guam. Next acquistion through Buckhorn and Vandenberg we'll have at Goldstone, rather, we'll have television at Goldstone of the theodolite operations and the door operations. We came up at Guam the port door was closed and latched, the starboard door was down close to the closed position. They were

checking the latches that procedure called out in the crew activity plan. Gordon Fullerton reporting no problems with the payload bay doors. No thermal problems after close to 80 hours no sun. We passed up the pad for the orbital maneuvering systems burn. That burn 1 hour 5 minutes away now. Will be out of plane consists of actually 2 firings. The first one 2 seconds and the crew will wait 4 minutes and then fire for 14 seconds. Resulting orbit expecting to be 133 by 125 nautical miles. We're 13 minutes away from acquisition on the west coast of the United States at 5 days 4 hours 55 minutes mission elapsed time this is Shuttle Control Houston.

END OF TAPE

CAPCOM ...convenience, we'd like to get the shutters cycled on both the star trackers again. And also we're 50 seconds left in this pass and the next pass is Guam at 4:45 and at that time we will be reading up the OMS pad for the burns.

SPACECRAFT Okay we'll see you at Guam.

CAPCOM Roger.

PAO This is Shuttle Control. Columbia heading out over the Indian Ocean now out of range of Botswana. Misses the Australian tracking stations on this orbit. The next station is Guam in 27 minutes. Crew conducting payload bay door cycling. We've informed them that if they have any problems to take their time. The orbital maneuvering system engine burn scheduled for this afternoon is not that big of a priority now. That engine is not very cold and this test is a cold restart test. At 5 days 4 hours 19 minutes Mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 5 days 4 hours 44 minutes mission elapsed time. Columbia will soon be acquired at the Guam tracking station. The crew should be in the midst of the payload bay door cycle test. We'll standby.

CAPCOM Columbia, Houston through Guam for 7 minutes.

SPACECRAFT Okay. We got you at Guam. We got the port door closed and latched, and have got the starboard door down close taking a look at the center line latches right now. I have an ETI on the monitor two we've got a view for you.

CAPCOM Roger, Jack and we've got no TV over Guam.

SPACECRAFT Yeah, I (garbled) with you.

CAPCOM Columbia, Houston. We'd like to get the pad up for the cold OMS engines restart valve at this pass if we could.

SPACECRAFT Okay. (garbled).

SPACECRAFT Okay, I got a pad right here . Go ahead.

CAPCOM Roger, Jack. First on the top, there is no blank, but we'd like you to put the tv roll to 139 degrees and that's to optimize our maneuver back to top sun.

SPACECRAFT All right, you set the tv roll at 139, say again about top sun.

CAPCOM Roger, Jack, and that's just to optimize our maneuver back to top sun.

SPACECRAFT Oh, okay.

CAPCOM Okay, and here comes the PAD trimload 0.2 5.1 weight 218650 TIG 005 06 00 00. Delta VX total 1.8 02 +01 .70 +0.36 +0.47 HA is 133 HP 125. Over.

SPACECRAFT Okay, I copy tv roll of 139. Gimbal trim load 0.2 and + 5.1. 218650 005 06 00 00. 0.0 Delta VY is -1.8 and Delta VZ is 091 189 069 1.8 02 +01 .70.

END OF TAPE

SPACECRAFT landing from coast in. As we left it we kind of determined if we ran it 12 frames per second we don't have enough even if we cycle the (pause Just wondered if you have any more chance to think about that the best way to do that and get the pictures all the way if we could of the track across the southwest there. Maybe if he's thinking about it if not you might remind him and come back to us with a plan.

CAPCOM Roger, Gordo, we copy, and we'll look into that and get back with you later.

SPACECRAFT The optimum is a way of getting them running and not having to touch them after we do it so that we don't mess up the plan and so it's less likely for us to make an error, but whatever will do the job.

CAPCOM Roger, Gordo. And Gordo, one comment for you, on the payload bay door operations coming up. If the one degree deadband is causing enough jet firings to disturb you in the theodolite measurements you're clear to go ahead and open that up to 3 degrees if that will help, over.

SPACECRAFT Okay, it certainly will disturb you when one goes off, just how long it takes everything to settle down remains to be seen and so we'll keep that in mind.

CAPCOM Columbia Houston, just a recap of our payload bay door plan this afternoon. We're planning an OPS normal check as per the cap, if however we do have a problem our plan is to stop if we have a hang up and get as much data as we can with the VTR the theodolite and the cameras, then to open the door back up and go top sun for 15 minutes and try the door again and we'll be staying in top sun since that will be our attitude for the rest of the flight, over.

SPACECRAFT Okay, understand the plan George.

CAPCOM Columbia Houston, Jack, on the chance that we do need to go top sun you can just execute the auto maneuver that's on page 104 of the CAP, over.

SPACECRAFT Okay, very well, I won't do it unless you holler through, right?

CAPCOM Roger, Jack. You're go to proceed to top sun after you've gathered the data if you have a problem with the door and get it back open again, over.

SPACECRAFT Okay, very well, understand.

CAPCOM Roger, and while we're talking, we've got one other small change on page 4-102 of the CAP. We'd like

to get some time on flash EVAP primary bravo. So at 410 in the CAP there's a callout to go to flash EVAP controller primary alpha to on, we'd like to change that to primary bravo to on, over.

SPACECRAFT Okay, at 410 you want prime B on.

CAPCOM That's affirmative. Columbia Houston, we're 40 seconds to LOS and Ascension is next in 13 minutes.

SPACECRAFT Alright George, we'll see you at Ascension.

PAO This is shuttle control. Columbia's out of range now, heading down the Carribean and then down the east coast of South America on the 84th orbit. Next acquisition through Ascension Island in 13 minutes. During this pass Jack Lousma remarked about the spectacular view of the west coast and inland as far as Las Vegas. He reported White Sands wide open. Said he could see both runways there and Gordon Fullerton remarked he could see the precision approach path indicator lights. We have some T-38's out there today shooting landings for

END OF TAPE.

CAPCOM Columbia, Houston we're 40 seconds to LOS, States are next at 3 plus 34.

SPACECRAFT Okay, George, we'll see you at the States.

PAO This is Shuttle Control. Loss of signal at Hawaii, next station Buckhorn in 3 minutes. The handover here in the control center is now complete. Flight Director Neil Hutchinson and the silver team having taken over from Flight Director Harold Draughon and the crystal team. CAPCOMs on this shift are, Astronauts Sally Ride, and George Nelson. At 5 days 3 hours 31 minutes mission elapsed time, this is Shuttle Control Houston. This is Shuttle Control at 5 days 3 hours 34 minutes mission elapsed time. Columbia about 15 seconds away from acquisition through Buckhorn. The crew still in the lunch period.

CAPCOM Columbia, Houston back with you over the States for 16 minutes.

SPACECRAFT Okay George, hear you loud and clear I guess I better go up and take a look out the window and see what the States look like.

CAPCOM Roger Jack, your loud and clear also.

SPACECRAFT Hope you folks are all enjoying on the ground as much as we are, this is a bummer have to be standing down there working, but we're glad your aboard.

CAPCOM Roger Jack, we'd rather be up there with you, but given the other choice it's cold and rainy outside, I was just as happy to be inside here.

SPACECRAFT (garble) okay.

SPACECRAFT Okay, we got some PGU numbers and got some PGU numbers for you.

CAPCOM Thank you Gordo, we're ready to copy.

SPACECRAFT Okay, time was day 5 0235, power light's on, 26.9, 26.7, 26.3, 26.3 26.9, 27.3 lights are all okay and the lamp status is on.

CAPCOM Okay Gordo, we copy thank you.

SPACECRAFT Got a spectacular view of the West coast up here George, see it the Gulf of Baja, the Baja Pennisula over at Edwards, Los Angeles the Salton Sea and so forth, Lake Mead, Las Vegas.

CAPCOM Roger Jack.

SPACECRAFT We just surveying the ground track we're gonna fly on Monday coming into White Sands, and White Sands appears right now to be wide open.

CAPCOM Okay, that's good news.

SPACECRAFT I could even see runway 17 and 23 from here.

CAPCOM Roger Jack.

SPACECRAFT Two white and two red copy lights.

CAPCOM Roger Gordo, I'd better wave off this time, wait a couple minutes.

SPACECRAFT Okay, just looking at the landing site reminded us of something we'd like to.....

SPACECRAFT You still there Houston?

CAPCOM Roger. Columbia, Houston. We lost you there in a handover with Salinas Peak. How do you read now?

SPACECRAFT Okay. Loud and clear. Looking at Northrup as we went by reminded us of a conversation we never really completed prior to lift off. We were talking to Dave Brooks and the idea was to maybe revise the plan for operating the two forward facing DAC cameras during entry in an attempt to photograph an entire run inall the way to landing from coast in...

END OF TAPE

CAPCOM Columbia Houston, our data doesn't show us that the high load duct heater is turned on called out for on page 100 of the CAP, we'd like you to check that.

SPACECRAFT Yea, we purposely didn't turn it on, Brewster, we know you didn't want to interrupt lunch and we were willing to do it at 30 so it'll only be on for 1/2 hour but if you want it on for 45 minutes we'll do it now. I noticed that we'd have it on about an hour if we did what it said and we knew you weren't trying to interrupt our lunch, but I really didn't mind going up and putting it on. In fact, I'm in there right now and I'll do it.

CAPCOM Thank you Jack.

SPACECRAFT High load duct heater's in baker now. I just got a thermal evaporator message and I'm looking at spec 88, some low temps, off scale low on high load outboard nozzle and high load inboard outboard ducts. Want to take a look at those, Brewster?

CAPCOM We are looking at them, Jack, and we are told that's a normal response. And Jack, we're 15 seconds LOS. Hawaii's next in 8 minutes.

SPACECRAFT Alright, see you in Hawaii. Thank you Brewster.

CAPCOM Roger, sorry to interrupt your lunch.

SPACECRAFT The EEVT sample A there's all put to bed back in the right spots.

CAPCOM Okay, thanks Gordo.

SPACECRAFT (garbled) more to go. Number 7.

PAO Shuttle Mission Control. 5 days 3 hours 17 minutes. Loss of signal through Guam. Acquisition again in about 7 and 1/2 minutes through Hawaii. Representing the last instance of exchange between the crew and the crystal team on this shift and a new capsule commanders for the oncoming silver team will be George Nelson and Sally Ride, flight director, of course, Neil Hutchinson. During that pass Gordon Fullerton remarked to the ground that he had completed and stowed the electrophoresis validation experiment and the freezing of those 8 collector samples have now been performed and that there concludes the EEVT experiment for this flight. And the data will be analyzed further once the samples are returned to earth. Acquisition of signal in a little less than 7 minutes. At 5 days 3 hours and 18 minutes this is Shuttle Mission Control with a reminder that off going flight director Harold Draughn will conduct his change of shift press conference in the Building 2

News Center at 2:00 p.m. central time. This is Shuttle Mission Control. This is Shuttle Control at 5 days 3 hours 25 minutes mission elapsed time. Columbia within 30 seconds of acquisition through Hawaii.

CAPCOM Columbia Houston, silver teams' with you through Hawaii for 5 and 1/2 minutes and I hope you enjoy your lunch.

SPACECRAFT Hello there silver team. Welcome onboard. We are enjoying lunch.

CAPCOM Roger.

SPACECRAFT I believe you're sending a telegram message aren't you George?

CAPCOM Roger, Jack, there's some entry weather coming up.

SPACECRAFT Okay. George, I think we're going to have to stay up here an extra couple of days in order to get all this food eaten. We can't come back with a full locker you know.

CAPCOM Roger, Jack, we'll put that in work.

PAO This is Shuttle Control at 5 days 3 hours 29 minutes. We're in a keyhole now at Hawaii. About 10 seconds we should have comm again.

END OF TAPE

PAO ...downlink data are now being processed through the Ascension Island S band station and being looked at by the flight controllers here in the Mission Control Center. 7 minutes remain in this pass at 5 days 2 hours 28 minutes this is Shuttle Mission Control.

CAPCOM Columbia, Houston. We're 30 seconds LOS. Botswana is next in 5 minutes.

SPACECRAFT Okay see you there.

PAO Shuttle Mission Control. Have acquisition of signal in about a minute through Botswana. Columbia on it's 83rd orbit. Flight Director Neil Hutchinson is in the Mission Control Center with many of the members of the Silver Team. Neil Hutchinson the lead Flight Director for STS-3 and now involved in the debriefing process with Flight Director Harold Draughon and his team and we'll be having handover here in about an hour in the Harold Draughon change of shift briefing for the press will occur we believe on time at 2:00. We should have voice contact momentarily through Botswana. This is Shuttle Mission Control at 5 days 2 hours 40 minutes.

CAPCOM Columbia, Houston through Botswana for 5 1/2 minutes.

SPACECRAFT Okay. We're hearing you through Botswana Brewster. Hm, the lights went out outdoors. Went dark.

CAPCOM Okay. And you're 5 by.

SPACECRAFT Okay and we just completed 16 mm of the PGU setup and Gordo is completing his electrophoresis and looks like we're right on time.

CAPCOM That's good to hear Jack.

PAO Shuttle Mission Control. Jack Lousma remarking that they had set up 16 mm camera for documentation of the plant growth unit heat flex experiment in the middeck which is the germination of sun flower seeds in various levels of moisture. Another 3 1/2 minutes of AOS of acquisition of signal through Botswana.

CAPCOM Columbia, Houston. We're 25 seconds LOS. Yarragadee is next in 13 minutes.

SPACECRAFT Okay Brewster. See you at Yarragadee.

CAPCOM See you there.

CAPCOM Columbia, Houston with you through Yarragadee for 7

minutes.

SPACECRAFT Okay through Yarragadee. We were just making dinner here.

CAPCOM Looks like time for lunch. That's right Jack.

CAPCOM Columbia, Houston, we're 10 seconds LOS so see you next in Guam at 7 minutes.

PAO Shuttle Mission Control 5 days 3 hours 12 minutes. Just a minute away from acquisition of signal through Guam. Duration of that pass will be about 3 1/2 minutes. It's meal time onboard Columbia right now so we really don't think there's going to be a terrific amount of dialog between the ground and the crew. This will be the last pass for Harold Draughon and the Crystal Team and between Guam and the next AOS at Hawaii, Flight Director Neil Hutchinson and the Silver Team of flight controllers will assume responsbility for this flight. The meal period goes on for about another 45 minutes and following it there's a rather significant event having to do with the payload bay doors having been in this cold soak attitude the flight control team is extremely anxious to see what the product of the payload bay door tests are going to be here this afternoon. We're AOS at Guam and standing by for contact with the crew. Shuttle Mission Control.

CAPCOM Columbia, Houston through Guam for 3 1/2 minutes. Over.

SPACECRAFT Okay we read you loud and clear Brewster.

CAPCOM Read you 5 by Jack, how's lunch?

END OF TAPE

SPACECRAFT Probably right now won't you?

CAPCOM Say again, Jack.

SPACECRAFT Guess tomorrow, you'll be right where you are right now, won't you?

CAPCOM Probably so.

SPACECRAFT Same here.

CAPCOM And Columbia Houston, would you select DAP A please that'll get our deadbands down to 1 degree and hold us a little tighter in attitude.

SPACECRAFT Okay, and that'll be making us ready for the maneuver too, won't it?

CAPCOM That is correct.

SPACECRAFT Just right now we got boom boom.

CAPCOM Columbia, we're 30 seconds LOS now. We'll pick you up next at Dakar in 6 minutes.

SPACECRAFT See you at Dakar Steve.

PAO Shuttle Mission Control at 5 days 2 hours 19 minutes. Loss of signal through Bermuda. Concluding a fairly long pass over the continental United States. Reacquire again in about 5 and 1/2 minutes through Dakar and through Ascension Island for another relative long acquisition of signal period coming up. And the crew activity plan reflects a. Mission commander, Jack Lousma, doing some payload operations with the induced environmental contamination monitor while the mission plans have scrubbed the deployment of the IECM. The experiment will never the less acquire data during this flight. Meanwhile, pilot Gordon Fullerton will be down in the Shuttle mid deck doing some meal preparations. Columbia at its 83rd orbit of the Earth. Once again, the mission management team has determined to opted for a nominal landing at White Sands at 1:27 p.m. central time Monday. Data indicating that weather will support that plan. And once again, the combined time of STS-1 and STS-2 was 4 days 12 hours and 34 minutes. And STS-3 has now far exceeded the combined time on the airframe of the vehicle for the first two flights. Mission elapsed time is now 5 days 2 hours 21 minutes this is Shuttle Mission Control. Shuttle Mission Control. 5 days 2 hours 25 minutes. Standing by for acquisition of signal through Dakar and an overlap of AOS with the Ascension Island station gives us about 10 minutes of contact in all during this period, now orbit 83, vehicle in daylight